In This Issue—*Making Maintenance Pay*

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MOTOR AGE

Vol. XLI
Number 13

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CHICAGO, MARCH 30, 1922

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Champions
For Every Engine Everywhere

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A SPECIALLY DESIGNED SPARK PLUG FOR EVERY TYPE OF ENGINE
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Look for the CHAMPION "Why and How," "Ask 'em to Buy" booklet that will be mailed to you. *It will contain information, valuable, yes vital to you. Read it carefully.*

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Right now, when motorists are over-hauling their cars and adding new equipment, is the time to establish **your** place of business as headquarters for the A-L-T Sunbeam Visor. It's a "class" product that enjoys a mass sale—high in quality, moderate in price, with a satisfactory margin of profit for you in every sale.

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Ask Your Jobber for the Sunbeam. If He Can't Supply You, Write Us—Don't Accept a Substitute.

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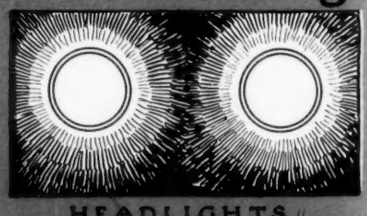
Everything in Glass for the Automobile
FAIRFIELD, IOWA

Fairfield, Iowa

Three of the greatest menaces to safe motoring

WE CAN'T CURE THE MOONSHINE
BUT WE CAN DO A LOT TO HELP
THE OTHER TWO



MOTOR AGE

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Entered as Second Class Matter Sept. 19, 1899, at the Post Office at Chicago, Ill., under Act of March 6, 1879.

MONROE

Self-Oiling

TIRE PUMP

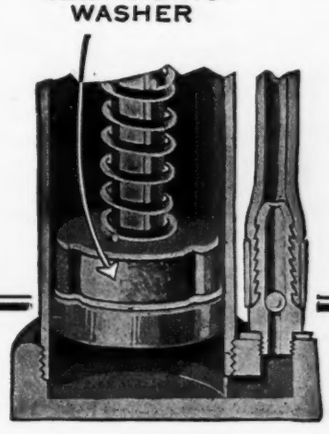
Now Is the Time to Ask 'Em to Buy It

Get set now for spring pump sales! This is the time of year when folks are overhauling their cars and buying new equipment. A lot of them will need new pumps. Ask 'em to buy a MONROE Self-Oiling Pump—the pump that won't dry out in their cars. The *never-failing* and *lasting* service they'll get from a MONROE will be appreciated. Another *satisfied* customer will be the result. And you know how that pays. *Now is the time to get ready.*

Write for Details and Prices

Monroe Auto Equipment & Manufacturing Co.
Monroe, Michigan

Sales Representative: The Fulton Company, Milwaukee, Wis.



This self-oiling washer—an exclusive patented Monroe feature—is the secret of the MONROE'S reliability. It keeps the pump ready for instant action because the washer will not dry out.

More Help for You Dealers!

Page 28
THE SATURDAY EVENING POST
April 15, 1922
FORD-OVERHAUL TIME
Is Yours Ready
How to Revive Your Ford's Ignition
Coils. File vibrator contact points smooth, see that they meet squarely, and set all evenly to a gap of 1/32 inch. Your Ford dealer will willingly test them for even tension. Have this done.
Plugs. Disassemble all spark plugs, wipe porcelains clean, examine closely for cracks. Better replace porcelains if they have gone over 5,000 miles. Scrape plug body clean, reassemble and set gap at 1/32 inch.
Wiring. Examine for oil-soaked, frayed or exposed places. Better replace entire "harness" if in doubt. Seldom worth while to repair with tape, etc. See that fan or fan belt cannot rub wires.
Timer. Remove case and brush assembly and examine for wear. If race is bumpy or irregular, contacts loose, or brush assembly badly worn, replace with complete new timer—one you know is good. Oil thoroughly—follow manufacturer's directions. See that wires are attached firmly, and that advance rod is set for correct advance and retard action.
Above all, don't "try out" any complicated or cheap timers. Play safe!
The short-circuit-proof timer! Contact points sealed and anchored in their machine-cut grooves by a special method (patent applied for).
MILWAUKEE

Make the Most of Overhaul Time

FORD owners tinkering in their garages mean customers coming into your store for accessories and replacements.

Most Fords need a new timer this Spring. Make a real effort to get your share of this business. We'll help all we can.

At the left is a reproduction of the Milwaukee Timer full-page which appears in The Saturday Evening Post April 15th. Ask the postmaster or newsdealer how many Posts come into your town and you'll know what this means to you.

This full-page, appearing right at the start of the big timer-buying season, sells the "new timer" idea. *You* make the sales and a good profit by carrying Milwaukee Timers and *pushing* them.

If your supply of Milwaukee's is low, re-order now from your jobber. Be sure you have enough to meet the "Overhaul Time" demand.

Milwaukee Motor Products, Inc.
Milwaukee, Wisconsin

Get One of These

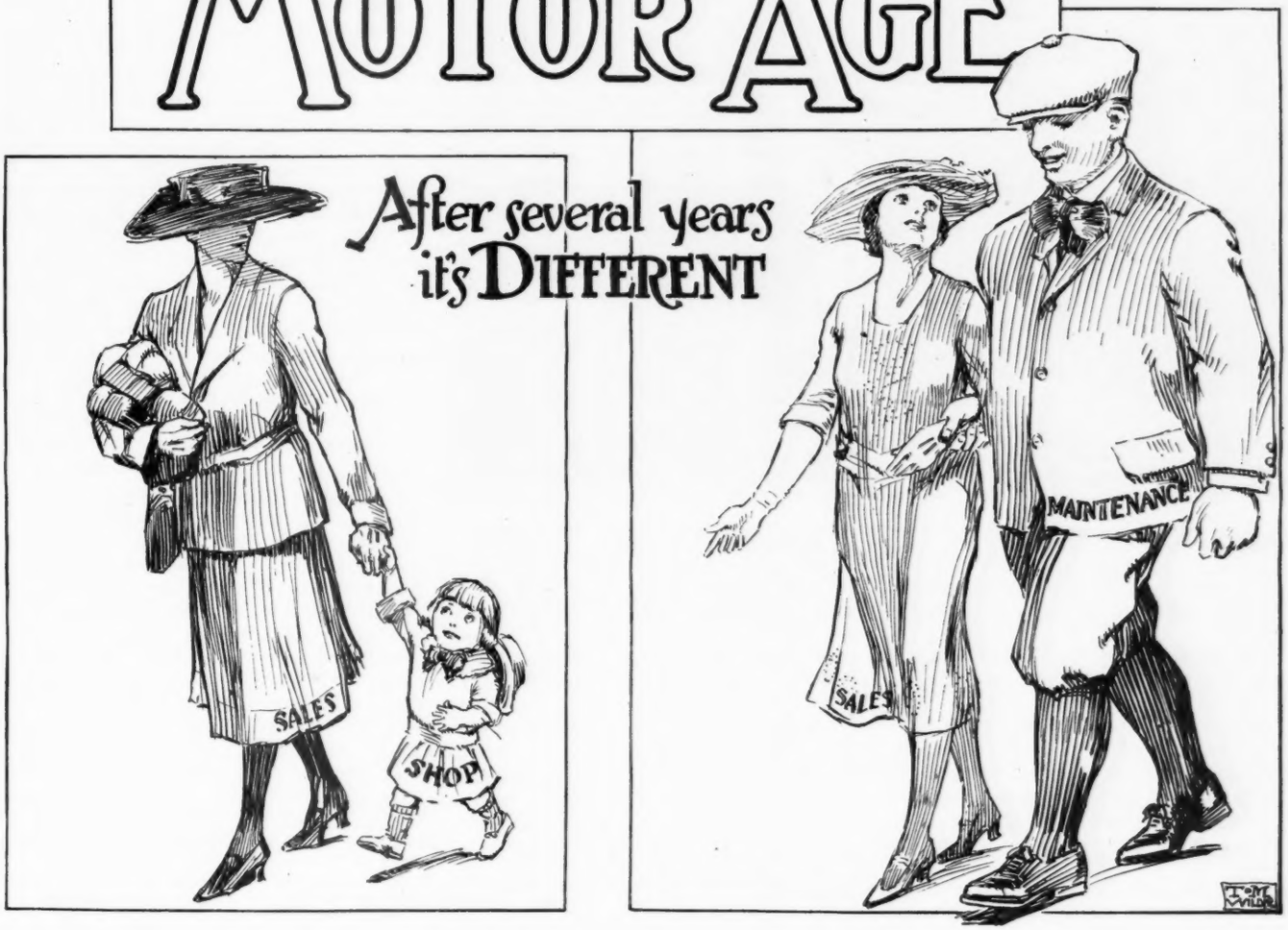
If you haven't a Milwaukee Timer Steel Display Stand for your window or counter, write us for one today. Sent *free, postpaid,* on request.

Milwaukee Timer sells at

$2.00

Vol. XLI, No. 13 CHICAGO, MARCH 30, 1922 $3.00 Per Year

MOTOR AGE



Making Maintenance Pay

THIS Is the Introductory Article of a Series Dealing With the New Order of Things Which Must Be Practiced by the Maintenance Division of Every Dealer's Business.

BY B. M. IKERT

ALONG with the better methods of selling maintenance work on automotive vehicles which rapidly are coming into more general use there will come a better and much needed method of operating the maintenance department.

Better methods must be practiced all along the line; in the main shop, or the quick service floor, parts department, washing, oiling and greasing departments, etc.

It makes no difference whether the department is large or small, there will be plenty of things which can be given attention and which will not only win the respect of the customer, but prove profitable as well. It is a sad condition when a dealer tells you his maintenance department loses money; but he does not mind this because he figures on his new car sales to carry the overhead. Maintenance ought to make money. The business of servicing automobiles, trucks or tractors is one of the most legitimate ones in the world. True, the aim of most dealers is to keep their customers satisfied with their cars or trucks. They want to keep these vehicles on the road, in good operating condition, but there is no reason why this has to be done at a loss.

A better operated department is needed because most "shops" today do not stand very high in the opinion of the motoring public. And it is not to be wondered at. The reader should bear in mind that we are not condemning every maintenance

The biggest job in making maintenance pay is to sell it right to the customer in the first place. Another is to make sure that the customer leaves the building in a happy state of mind. In this picture we show a service salesman greeting a customer. When not otherwise busy he is at his desk shown at the left. No customer can enter without being given almost immediate attention.

department but as long as the dealer refers to this end of his business as a "shop" it will not attain the dignity it should.

There are some very fine institutions selling service. And, they are well equipped and managed. The trouble is there are too few of them. The service business as a whole has not awakened to these facts.

There still is too much filth and dirt; too little system; too little equipment; too little appreciation of the importance of doing work properly and selling it right; too little realization of the fact that the customer is the meal ticket and the most important factor in the industry.

Why is it that when you talk to most car owners they complain of present "shops" and service stations? Why do we hear the terms "robbers," "gyps" and others applied to the maintenance end of the business? The answer is easy.

The maintenance work on cars, trucks and tractors never has been sold properly, and in many cases it never has been executed properly. Conditions have improved during the last year or so and today we do find service stations conducted in a business-like manner and making money on their service. On top of it all their customers swear by them, not at them.

System and Equipment

In the new maintenance establishment the actual operations of repair are only a link in the business chain. This has to be so because no matter how well a job might have been done in one part of the building, say in the machine shop, it may be undone in the assembly of the car, unless proper inspection is there to catch it before it is turned over to the customer.

As one service manager told the writer recently, "We must do all our fighting before the job is started or before the customer gets his car. After it is delivered to him there should be no necessity for argument."

You may be operating a large maintenance establishment, but you may be doing it very inefficiently. Just because it is large does not mean it is being run at a profit and with satisfaction to the customer, so that you have his good will. In fact, some of the very best maintenance departments of which we have record are comparatively small ones, but are operated along business-like lines. And all of this is true because the men running them apply fundamentals that apply to any other lines of business.

There still are too many in this service business who think that records applied to maintenance mean "too much red tape." Of course, there is such a thing as overdoing it. No elaborate system of recording maintenance or billing the customer is necessary. Some of the best conducted departments we have seen have probably no more than five or six forms for use. And best of all, these forms are so arranged that they can be handled by clerks, sometimes boys, thus cutting down office overhead and setting the manager or foreman free to attend to major problems. With the right system installed, it is possible for the manager to be gone for a week or more without seriously affecting the routine of the institution. Imagine a manager in the average "service station" being gone from his post for a week. In most institutions he is kept busy trying to pacify an irate customer, who probably has pretty good reason for complaint.

The unsystematic handling of maintenance in the past is what has been largely responsible for the "black eye" given the repair business by the public in general. You can not wonder at it when you see a dirty building, dirty floors and greasy mechanics exposed to public view. On top of it you see a workbench all cluttered up with tools and parts, oil barrels, oil buckets and grease guns all over the floor, a man trying to write down shop records on any kind of a piece of paper, poor placement of machine tools (if indeed the shop can boast of any), no place for the customer to sit down, no place where he can conveniently talk about his car with the service manager. His car will be turned over to him in just the condition the mechanic left it. No one thinks of cleaning it up and making it presentable.

Better Understanding of Maintenance in Industry

There is no system of inspection to insure the exact condition of the various units. Everything is slipshod. If the customer don't like the job, he can take it or leave it.

Again we say there is no system to handling of maintenance after this manner. The great trouble is that people in general have gotten the idea that this sort of automotive shop is the kind we shall always have to put up with.

That is why MOTOR AGE has taken a stand for making maintenance pay; this industry must show the motoring public and the users of automotive equipment that this business of maintaining cars, trucks, tractors or whatever the vehicle may be can be done along lines that will meet with the approval of every one. Making maintenance pay not only means the providing of right equipment, of using proper working methods, of doing a piston fitting or axle job right, of cutting down losses, or installing several engine stands. It means vastly more than this. It must mean welfare work among the men. It means the upbuilding of morale. It means the "selling" of this growing industry, both in and out of the automotive industry.

Environment is a big factor in the shop. Place a mechanic in a lot of dirt and grease, with poorly arranged benches and no engine stands; let him pay for his own laundry work, and let him know you have no system of inspection over his work and ten to one he will not care very much how he does the work. And why should he? There are no inducements.

On the other hand, put a man in a shop with plenty of light; clean floors, clean benches, good equipment, good toilet facilities; let him know that the foreman inspects every job

and that efficiency is the keynote in the shop, and he probably will give you the best that is in him. There is an incentive for him to do his best work. He benefits, the business benefits, the customer benefits and the organization prospers.

Of late there has been much said and done on the part of the car maker, the dealer and others connected in some way with the industry on the subject of maintenance. A little while ago, when the new car salesman would not even get out of his chair to tell you that you might expect delivery on a new car in five or six weeks, maintenance was not considered very seriously. It was not thought of during that period as having a direct influence on new car sales. Dealers could not get deliveries, so why worry about maintenance. They could sell all the cars they could lay their hands on.

But today the live dealer and the factory are turning their attention to maintenance as never before. Instead of a dealer having a small "shop" in the rear of his salesroom, we often find a separate building devoted exclusively to maintenance on the cars he is selling. Maintenance is becoming recognized as a real business. It is allied with sales, of course, but it must be handled separately, if it is to be run as a real business. And being operated unto itself, it must have its own systems and methods, its own personnel and must be able to stand on its own feet regardless of new car sales.

The proper selling of maintenance together with making maintenance work pay will depend much on the conduct of the "shop." Here is shown a foreman in "a better operated shop" at his desk, not at the bench doing work which a mechanic ought to be doing. This foreman directs and inspects the work and is responsible for all the jobs that go out.

It can be done, because it is being done. We can have little sympathy with the dealer who says he is satisfied to break even on maintenance. Those days are past, because maintenance departments, properly managed, can and will show a profit, and a legitimate one. Every car owner is willing to see the maintenance department make a legitimate profit on the work on his car. He knows a piece of machinery, like an automobile, will wear in time. If properly sold, he knows that bushings have been used in the makeup of his car and that in time they can be replaced by new ones and his car will be almost as good as new. He will appreciate the difference between maintenance and so called "free service."

With the coming of the flat rate system of selling service work, there must also be a wholesale improvement in the management of the shop. The flat rate system is best used by the best maintenance departments because in such a department it is but a short step to the application of the flat rate system. No one can expect to make a success of the flat rate system in an establishment run on the hit and miss principle.

A Real Business Is Ultimate Goal

How really important maintenance has become can be noted from the recent products of some of the large machine tool makers of the country. Lathe makers know, for example, that a lathe for the automotive shop must meet certain requirements. Working on an engine in a station is different from handling such an engine at the factory where it was built and consequently certain equipment is needed to suit the needs of the service station. All sorts of appliances have been devised for speeding up repair work and doing it more efficiently. Some car makers design and build equipment which they require dealers in their cars to buy for maintenance. More and more of this will be done as time goes on. Manufacturers know what the "boys on the firing line" meet in maintenance problems and consequently are lending a hand to better conditions.

Those who expect to make a real business of maintenance must, sooner or later, wake up to the fact that they must revise their present facilities and sell maintenance as it has never been sold before.

They must expect to alter their buildings, if necessary, to get the best results.

They must be prepared to install new machinery and tool equipment to speed up the work and insure uniform results.

They must make sure that mechanics work under the best conditions possible and that they do not have to take unnecessary steps.

Stopping the Small Leaks

There must be elimination of waste. If necessary, let the dealer hire a boy at $10 or $12 a week and let him be responsible for oil, grease, gasoline, sandpaper, crocus cloth, etc. Let him go around and pick up the oil cans, and other apparatus which the men use in the shop, leave on the floor and which easily are ruined by having cars run over them. You will be surprised how much waste a boy can stop. It will pay his salary and show a profit.

The efficient maintenance establishment must come. It already is here in isolated cases. The dealers, collectively, however, have not given this part of their business sufficient attention.

Old methods will no longer do. If you find that portable work benches will speed up the work, install them in preference to one bench along the wall. Similarly if you find a portable crane better suited to your needs, buy it in preference to an overhead track system. In other cases the reverse might be true.

The attainment of a proper maintenance department does not mean necessarily the expenditure of a vast amount of money. Some of our present day "shops" have all the equipment they need, but it is not used judiciously, nor is any attempt made to sell the customer rightly.

This article is only a general statement of the problem. There is much to say, and a great deal must be presented in detail. The further discussion of this problem will appear in MOTOR AGE from week to week. This general subject of MAKING MAINTENANCE PAY will cover a multitude of topics and will explain to you how to use THE BETTER OPERATED SHOP, which was planned as the original subject. But the perfect "shop," if conducted in connection with a loose sales plan, a poor accounting system, a careless delivery method, would only be an expense. There must be no loose ends nor weak links in the chain that ties profits to maintenance.

Varied Program Makes Profitable Day of Illinois Automotive Trades Convention

Retiring President Tells How Crisis of Dwindling Membership Was Overcome and Roster Increased to 713—New Officers Elected

By CLYDE JENNINGS

Decatur, Ill., March 21.

AS seems fitting for the big problem before the automobile dealers this season, the Illinois Automotive Trades Association yesterday elected B. B. Burns of this city, a used car dealer, as president to succeed H. B. Pinkerton of Peoria. Pinkerton has been president since the organization of the association and was given much praise for his successful work and for his accomplishment of increasing the membership during the last fiscal year.

The third annual convention of the Association was notable for the attendance, more than 200 delegates having registered. There was close attention paid to the busy one-day program and more than 250 persons were present at the annual banquet.

Much of the informal discussion of the day, and a prominent feature of the program, was the used car problem. Paul Killeen of Galesburg, presented the Galesburg used car plan at the morning session. This plan is a modification of the Saginaw and Quincy plans, but like the others depends chiefly on the cooperation of the firms taking part. This cooperation is established by frequent meetings at which the members have free discussion of problems and tell of the ups and downs of the used car prices. In this plan, as in the Saginaw plan the recognized dealer in any car writes the list of prices to be paid for used cars of that make.

C. A. Vane, general manager of the National Automobile Dealers' Association, made his first appearance as a speaker since his advancement to this office. His presentation of the new N. A. D. A. membership plan was quite impressive and is printed on another page.

At the afternoon session, Ray W. Sherman, of the Automotive Equipment Association, spoke on the merchandising campaign of which he is organizer. He also presented the "Ask 'Em to Buy" film and especially called the attention of the dealers to the fact that the plan of asking car owners to buy accessories at the gasoline tank was merely typical of any business. In the automobile dealer establishment the point of contact was more likely to be in the maintenance department. His idea was that the merchandising effort should be made at whatever point the largest number of car owners came into contact with the staff of the dealer establishment.

B. B. BURNS

New President of the Illinois Automotive Trades Assn.

Sherman's recital of instances of profit made on small stocks of accessories and the necessity of calling the attention of the owners to such things as he might need, made a very strong impression on a great many of the down-state dealers who have been inclined to neglect this feature of their business while selling cars. His talk was a close rival to that of the used car problem later in the day.

The addresses of President Pinkerton and Secretary-manager, F. C. Zillman, brought out a story of the past year that was a surprise to most of those present. These two men told how soon after the last annual meeting the membership roll began to shrink and how President Pinkerton took the road with Manager Zillman and together they had lined up members in practically every section of the state, and despite the disposition to drop the association work on the part of dealers, had raised their total to 713.

Strongest Association Numerically

It was the belief of the association officers that it makes the Illinois Association numerically the strongest of any similar organization. The report on what had been accomplished during the last year was chiefly a recital of legislative efforts and of work in obtaining the proper interpretation of the state laws. The afternoon session was devoted chiefly to round table forums. The following sections were organized.

Passenger Car and Commercial Car Division—Paul Killeen, Galesburg.

Accessories Division—Phil Miler, Kewanee.

Repair Division—Geo. Haye, Decatur.

Tire Division—A. L. Stewart, Quincy.

Battery Division—Warren A. McCollum, Rockford.

The plan was for the chairman to lead the discussion. In the car division practically only the used car was spoken of. The "Ask 'Em to Buy" campaign dominated the accessory discussion. The need of laws to protect rental batteries was the topic of the battery discussion.

The work of the tire bureau of the Quincy Automobile Trade Association easily featured the forum hours. Chairman Stewart told how the legitimate tire dealers in Quincy have been brought into the bureau and how they have raised the standards of merchandising and advertise themselves to the public to an extent that they have greatly embarrassed the "Gyp" trade. He said that a membership in the bureau was now greatly coveted by tire dealers and that several months ago one dealer was expelled for misconduct. This dealer has since made an extraordinary effort and obtained his re-election as a member and had become one of the very best members. He, also, told of a considerable economy brought about through the establishment of a common night and Sunday maintenance station.

The following officers were elected:

President—B. B. Burns, Decatur.

First vice-president—R. C. Cook, Chicago.

Second vice-president—Morris Adler, Quincy.

Third vice-president—George Kelsall, Joliet.

Secretary—C. R. Constant, Springfield.

Treasurer—Thomas J. Haye, Chicago.

Directors for three years:

H. B. Pinkerton, Peoria.
H. L. Snyder, Danville.
W. H. Williamson, Rockford.

Director for one year—Ray C. Sparks, Champaign.

F. C. Zillman was re-elected Secretary-manager.

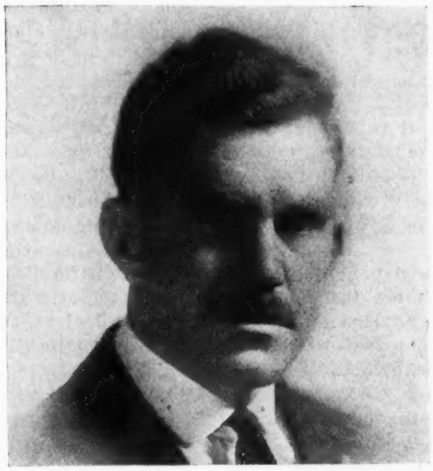
Quincy was selected for the 1923 meeting.

J. L. Murray of Bloomington was chairman of the Resolutions Committee. The resolutions were devoted to state activities, but were notable for the advocacy of good roads and economies in road building. The proposal for a state police was indorsed.

National Automobile Dealers' Assn.

Its Work

A High Standard of Merchandising Methods, a Loftier Code of Morals and Service That the Car Owner Can Be Assured of for Many Years, the Aim of National Dealer Body.



Its Benefit

"We must purge this industry of the 'circus gyp' and horsetrading methods if we are to gain the respect and confidence of the public."—Charles E. Doan, President, Doan Motor Company, Toledo, Ohio.

C. A. VANE

General Manager of the N. A. D. A.

The following address was made by Vane before the Illinois Automotive Trades Assn. Convention, Decatur, Ill., March 20

WELL, who is going to make the start?

Here and there over the country a dealer towers mightily above the general field. Here and there are dealers who stand as high in the automobile field as does Marshall Field in dry goods or Tiffany in jewelry.

Marshall Field and Tiffany not only have built a reputation, but they have made more money by following the highest principles of merchandising than any competitor. The same result has been attained in the automobile industry by the dealers who have sought to win the confidence of their customers, who have treated their customers honestly, fairly, given the customer what he wanted, what he needed and then took care of his wants after his original purchase.

These men in the automobile industry have worked alone, they have been isolated instances and by the force of their own example they have sought to elevate the standards of the industry and teach a respect and an enthusiasm for the automobile trade that would mean the confidence and patronage of the buying public.

They have been badly handicapped because they have been working alone.

In Union There Is Strength

They have sought this unification and they are determined that their business, their policies, their methods shall not be injured and blackened by the careless, general characterization of a public that has dealt with those who have been less faithful to the ideal, perhaps wholly unconcerned with the principle that a business must be built for permanence if it is to be built for profit.

The outstanding dealers have built for permanence. They have built for profit. They have built great institutions and spent hundreds of thousands of dollars to capture the greatest of business treasures—"good will," "public confidence and trust."

They have come to see that the battle cannot be carried on single-handedly. They have come to realize that these men who are doing the right things, the necessary things, must work as a unit, solidly together to convince the public and convince it speedily, that the automobile dealer body has some men in it, some institutions in it who are jealous, not only of the reputation of their concerns, but of the business in which they are engaged.

So they have demanded of their national organization, the National Automobile Dealers' Association, that a line be drawn in the industry by which those who are maintaining business upon the highest principles may remove themselves from the slurs and stigmas that have been brought upon the industry by the dealers who will not, or cannot, observe the Golden Rule of modern business conduct: "Treat the customer always as if he were your boss."

Eliminating the Undesirable

So the operating plan of the National Automobile Dealers' Association has been changed by these men who are demanding the highest principles of conduct from themselves and their associates, to demand the highest principles from all dealers engaged in the industry and to bestow upon those who have "arrived" and who realize the need of business practices, a mark by which they can be distinguished from the "gyp," the "horse trader" and the "circus performer."

Membership requirements in the association have been changed to demand that a member in the National Automobile Dealers' Association must have been in business not less than two years, must have a first class credit rating and a financial standing and a reputation for fair dealing, and honest merchandising not only with the fellow dealers of his city, but with the buying public as well.

Such a dealer as the one described must make direct application for membership in the National Association, he must submit as references not less than three endorsements of his fellow dealers, and then he must satisfy an investigation by a secret membership committee of the association which proposes to find out just what his standing is among the people with whom he does business.

Maintaining a Sound Reputation

If he is elected to membership he must keep on the straight and narrow path to continue his membership. The association has been made hard to get into and easy to get out of. Reputation is a bubble; prick it and it is gone. Membership in the National Automobile Dealers' Association will demand continued adherence to an ideal; the man who slips, who falters, who hesitates between the highest principles of proper conduct and the chance to profit by a shady transaction will find himself divested of his membership.

The by-laws of the association provide that a member may be expelled from the association for a number of causes which mitigate against the good name of the automobile industry. A member may be expelled for:

Insolvency!

Habitual failure to pay his just and honest debts!

Fraud, committed upon either the association, a member or the public!

Publication of false advertising!

Misrepresentation of his house policy!

Misrepresentation of his merchandise of whatever kind!

Conviction on any felony charge!

Disparagement or attack upon any competitor or his methods!

Loss of financial standing or loss of credit rating!

The dealer who is conducting a business and not merely "engaging in a game" will welcome the facilities that the National Automobile Dealers' Association has provided for him so he can be distinguished from the dealers who have no regards for ethical and proper methods.

For the work has only just begun that will benefit him.

When these men have been sifted out from the mass of dealers over the country the public will be advised by all the means that will be available for this purpose just who these dealers are that the public can profitably deal with.

Any manufacturer can build a motor car!

Any dealer can TELL a customer that the customer will be properly taken care of after buying his motor car.

BUT—

Only a limited number of dealers in the country can give the public a guarantee that the word passed to the customer will be kept!

It is this number who will benefit by membership in the National Automobile Dealers' Association. It will be the dealers who have weathered the storm who will comprise the association and upon whom the customer can rely to BE in business when the time comes to properly service the car.

Real Service From the Dealer

SERVICE will be the watchword of future success in the automobile business. Not the tinkering upon the car that can be done by any alley repair shop, but the SERVICE that will satisfy the owner. The dealer who is playing only a shoestring cannot perform this kind of service because his interest in a certain make of car may cease six months after a sale. He will no longer be in business. The public henceforth must be taught that value, not price, is the dominating characteristic in the purchase of an automobile, and that value can be obtained only in a car backed by a manufacturer strong enough to be in business during the life of the car and backed up by a dealer who will be in business when that car comes back, two years, three years, five years afterward, for attention.

How many dealers can give the public that assurance?

According to the January 1 figures of the National Automobile Chamber of Commerce there were 38,000 automobile dealers and 25,000 motor truck dealers in the United States. Granting that 60 per cent of the truck dealers also handle passenger cars, that leaves 48,000 individual motor vehicle dealers.

According to the records of Dun's and Bradstreet's, there are only 8,654 motor vehicle dealers in the United States who have a credit rating of $10,000 and upward.

Credit is absolutely necessary to expansion, continuation and prosperity of any business. The business of the world is done on credit, not on cash and the automobile industry is no exception.

Protecting the Owner's Investment

The customer then, should be taught to take more interest in the permanence of the factory that built the car and the dealer who sold it to him, than he takes in the wheelbase, the accessories, the torque control and other mechanical details of construction. The customer must be taught that a motor car with a father (the factory) and a mother (the dealer) will produce its maximum benefits only while it has both parents, and that it must not be orphaned, either of its factory or its dealer.

The dealers of the country then must have a way provided so they can sell the DEALER INSTITUTION to the dealer's customers, just as the factories have sold their institutions and then their motor cars to the public. For owning a motor car in this period means more, keeping in service the good car that you already possess, than trading it for a new car of doubtful merit, sponsored by a factory and dealer organization of no reputation.

But there are other items of equal importance to the dealer as the head of a prosperous financially sound institution.

Because this dealer is in the automobile business, other business men give him no recognition for the path that he has cut for himself and the perfection he has arrived at.

A striking example of the truth of this assertion is to be found in the matter of insurance.

The insurance companies told us that while their experience in the automobile trade has been unsatisfactory, disastrous even, there nevertheless were dealers in the business who have suffered little if any loss, but who were compelled to pay insurance rates that were designed to offset the losses of the careless dealers, the unscrupulous dealers and the repair shop and alley garage.

The Moral Risk in Insurance

The insurance companies told us that if we could eliminate the moral risk from the dealer insurance policy it would be possible ultimately to reduce insurance rates for these highest class of merchants 50 per cent. Every high-class merchant in our industry is convinced that his insurance rates are too high, but as an individual he can do nothing about it, because he is classed with the trade in which he makes his livelihood.

But the National Automobile Dealers' Association HAS DONE SOMETHING ABOUT IT!

In the city of St. Louis ten automobile dealers qualified for membership under the ONE OF A THOUSAND plan. We have placed the insurance for those ten dealers already, at an average saving on their liability alone of 43 per cent. We have doubled the coverage and in many instances given them a $2,000 property damage coverage which no one possessed.

We will be able to save through this special insurance feature of the association $25,000 this year for these ten dealers alone. The lowest total saving for any dealer was $800 and the highest $4,100.

This insurance has been placed in the strongest old line stock insurance companies in the world. It is not mutual or reciprocal insurance. It is old line coverage, in a company that is more than 100 years old and which has assets of $87,000,000 with which to pay claims and the highest record in the United States for prompt and fair settlements.

This insurance saving is possible only because the National Automobile Dealers' Association will be a QUANTITY buyer of QUALITY insurance.

Dealer Protection

Thousands of dollars have been lost by dealers annually because of petty thefts, pilferage, embezzlements and the like within their establishments. The National Automobile Dealers' Association recognizing this condition, has signed a contract with the William J. Burns International Detective Agency to protect the members of this association against such losses and to apprehend those guilty of such practices. This contract is virtually identical with the one between the Burns Agency and the American Bankers Association whose 26,000 banks in the nation are protected by this agency.

The association proposes, as its strength permits, to help dealers sell used cars, arrange better credit facilities for its members, represent them directly in their Federal tax adjustments and returns, develop a freight bureau which will seek to revise and equalize freight rates upon commodities of our industry, provide the information with proved selling plans that have been worked out not only by the best dealers of the country but by other industries which could be adapted for his use, and in every way to perform for him those services that will strengthen his reputation with his customers, help reduce his overhead, move more merchandise and enlarge his profits.

The officers and directors of this association are outstanding, successful figures in the automobile industry. Future membership will be made up of dealers who are just as successful and just as conscientious as these directors.

This Used Car Sales Plan Impressed a Manufacturer

He Got It From a Distributor and Is Now Passing It On to the Higher-Ups in the Automotive Industry

THE used car plan here presented comes from men who have dealt and are dealing in new and used cars. The men who thought out this plan have their money invested in cars. It was outlined to a manufacturer of automobiles who also has such contact with used cars that he thinks of them frequently, and he was so impressed with the idea that he is passing it on to other manufacturers. What follows is the way the manufacturer presents this plan:

-:- -:- -:-

ONE of the largest and most successful distributors in the country—a man who is perhaps as far-sighted as any business man in the industry—gave me the following suggestion as a method by which the second hand situation can be greatly improved for individual dealers. He said:

"A limited group of dealers selling cars of high second-hand valuation should individually adopt a certain sales plan.

"The specific steps would be as follows:

"Every dealer selling a car possessing high second-hand valuation should instruct his salesmen to begin tomorrow morning at eight o'clock to make the following truthful statement to every individual who comes in asking for a trade. Here is the statement:

" 'Mr. Jones, I would like to inform you regarding a policy which has just been adopted by this concern. It is based upon certain fundamental conditions in the automobile industry which you are no doubt familiar with.

" 'There are only certain cars offered for a trade which under present conditions can be sold the second time at a profit. After a certain date (to be specified) it will be necessary for us to refuse to accept in trade any cars that cannot be sold in the second hand market with profit.

" 'Furthermore, it is apparent that the factory production of the car we represent is not going to be sufficient to meet the spring demand. There are two reasons for this.

" 'First, we have been advised by hundreds of owners that they have decided to wait until spring to offer their cars for trade. This attitude on the part of the owners who expect to get their old valuations for second hand cars has so curtailed the factory production that we are certain it will not be sufficient to meet the spring demand.

" 'Second, our new list prices make it impossible for us to accept trades with owners who expect to be allowed old valuations.

" 'Therefore, if you are the owner of a car which you expect to trade later on, we recommend strongly that you negotiate with us today on the very best possible terms that we can give you. If you wait until the date specified it will make it impossible for us to trade with anyone except on certain makes of cars. After that date the valuations which will be accepted on the old cars will be those at which they can be sold in the second hand market with a reasonable profit.' "

Many Objections Immediately

Immediately every one who reads this plan will think of many objections. The dealer who thinks just once and stops thinking will say that the adoption of this suggestion would immediately curtail his sales.

I know that his sales would be immediately increased, but what is vastly more important, the terms upon which he could do business would be greatly enhanced. Therefore, his profit would be increased.

The distributor continues with his suggestion as follows:

"As the day of the expiration of the trading period on all cars approaches, the dealers will find owners willing to trade on a much more satisfactory basis than they are today. In other words, the deflation in old car valuations would start at once."

The next step in the procedure would be this:

"At the expiration of the period of grace certain dealers would individually refuse to trade except on cars which could be sold at a profit.

"This program should proceed over a period beginning about the first of March and continue at least until the first of September."

The above suggestion made by the leading distributor has many angles. If any dealer will just think the subject through without allowing some trivial objection to stop his mental operations, I am sure he will see considerable light.

Personally, I have no great hope that this plan will be adopted anywhere. My reason for lack of hope is the pride which sometimes outweighs good business judgment and the fear which is sometimes stronger than foresight.

The element of suspicion which dominates men's minds in times like these is responsible for many failures in business.

It is my belief that any one of three or four or five or ten leading distributors in each large community in this country can with perfect propriety individually adopt the first fundamental of business as a definite policy—that is—he can refuse to buy any merchandise at a price which is higher than that at which he will have to sell it.

Unless that policy is adopted voluntarily by certain dealers today, the losses of the next twelve months will positively force any survivors among them to adopt it before many months have passed.

Why wait until we are forced to do things?

The common answer is, "Why, if I did anything like that, think of all the trades the other fellow would take away from me."

It is my own experience in business that it is necessary to allow the brain to turn over more than once before reaching a conclusion. The second thought is usually a little better than the first, and the third sometimes solves the problem.

It is my hope that this letter will act as a mental self-starter.

SHORTAGE OF SKILLED WORKERS

Detroit, March 25—Shortage of men for skilled positions is taken by the Employers' Association of Detroit as an indication of a return to normal in general business. There is unemployment, the report declares, but mostly of men of no special training. For the week ending March 21, there is a reported increase in the number of men employed of 3,273 among the 79 firms associated with the group.

Buick Special Delivery Car

BUICK announces a light commercial car powered by a four-cylinder, valve-in-head engine. The wheelbase is 109 in. Three standard body types give this job a wide range of utility. Specifications are as follows:

MOTOR—Four-cylinder, valve-in-head type, removable head, automatically lubricated. Unit power plant, suspended at three points from main frame. Cylinders, 3⅜-in. bore by 4¾-in. stroke, extra heavy crankshaft with three large bearings. Exceptionally large valves operated by noisless adjustable push rods. Thirty-five actual brake horse-power.

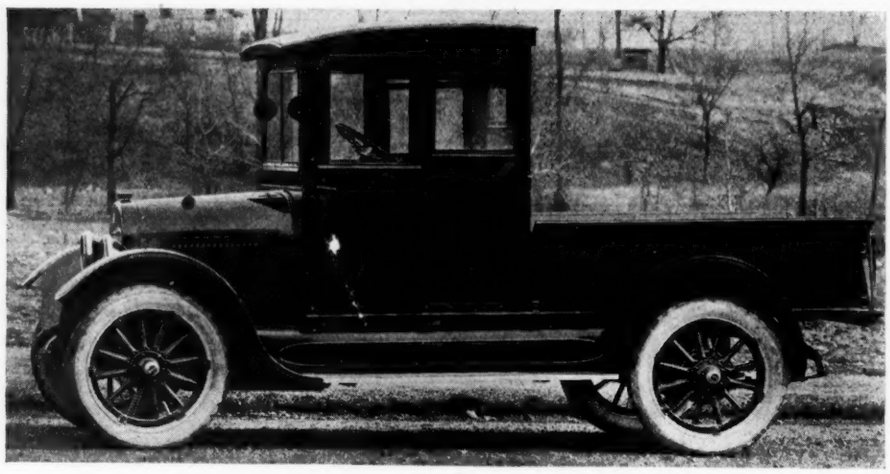
STARTER—Complete Delco, single unit system, for electric starting, lighting, and ignition, built as integral part of the motor and operating in conjunction with a large storage battery. Combination switch with ammeter and automatic breaker on instrument board.

CLUTCH—Multiple disk dry plate type, adjustment simple and accessible. Light pedal pressure required to operate.

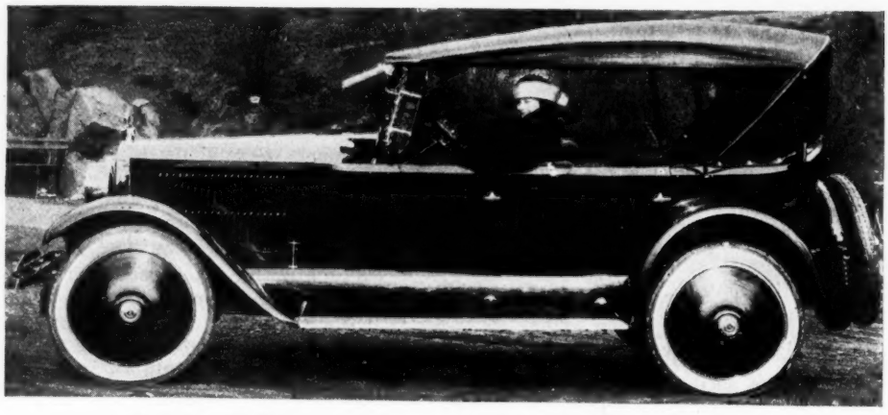
TRANSMISSION — Selective sliding gear type, three speeds forward and one reverse.

TIRES—Tires are 31 x 4 straight side cords.

STANDARD EQUIPMENT—Combination dim and full electric headlights, electric tail lamp and instrument board lamp. Motor driven horn, speedometer, gasoline gage. Alemite grease gun and full kit of tools. Prices of Buick Special Delivery: Open express delivery, complete, $945; canopy top delivery, complete with roll curtain, $965, with screen sides, add $50; panel side delivery, complete with steel panels, $980, with vehisote panels, add $25.



Buick "Special Delivery" light commercial car



New Mitchell DeLuxe sport model on standard F-50 chassis

A New Mitchell De Luxe Sport Model, $1830

A NEW Mitchell sport model on the standard F-50 chassis includes some changes in the fittings and a considerably augmented equipment. The standard colors are maroon or gray and disk wheels are provided. Other additions to the equipment include a De Luxe Moto-Meter, bar type radiator cap, solar drum type lamps, cowl or parking lamps to match, windshield wings and Cox twin bar bumper. All the fittings and accessories are nickel plated as in the radiator shell. The idea of a sport model was developed by the New York Mitchell Motor Co., Inc., and the model is now in regular factory production for distribution.

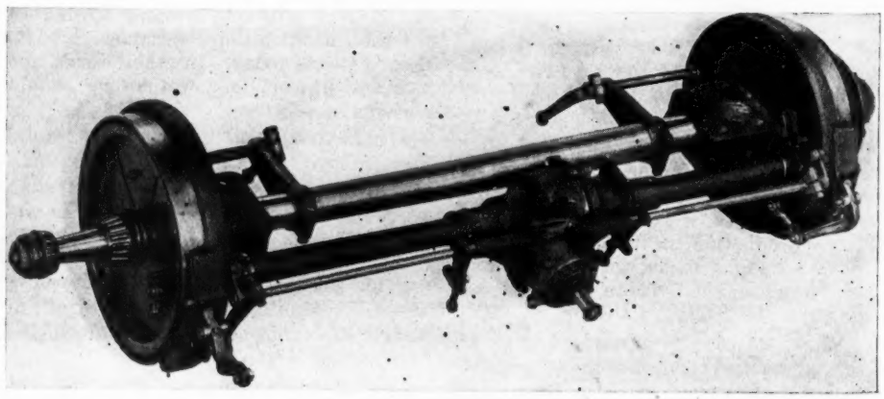
Russel Motor Bus Axle

Designed especially for use on motor busses, the Russel rear axle is made with considerable road clearance and permits the use of low floor boards because there is no large housing in the center.

Drop forged differential cases are used and the internal parts of the differential are of nickel steel. The drive shafts are increased in diameter to provide against additional deflection because of the increased length.

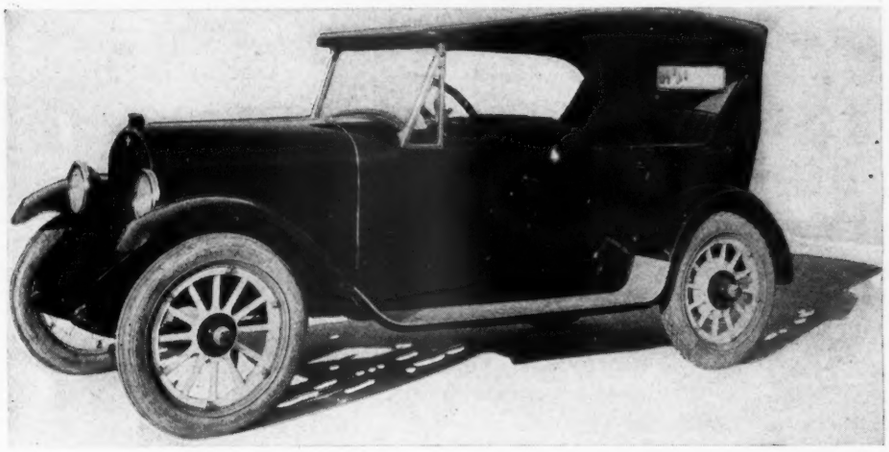
The left hand side of the jackshaft housing tube is free to float so as to take care of axle deflection caused by the load imposed upon the spring pads. The torque reaction is taken through the right hand jackshaft housing tube, which is made of heat treated chrome nickel tubing. This tube in addition to being riveted to both the differential housing and torque collar on the end, is also keyed to both. The torque collar is of heat treated drop forged alloy steel and the torque stresses are transmitted to the brake supports through two arms and heat treated alloy steel bolts which are a permanent fit in both.

The jackshaft outer bearings are of the single row radial type and protected from loss of lubricant or admission of dirt or other foreign matter, by means of a retainer in which is placed a hard felt washer. The spur pinion is mounted upon the outer splined end of the jackshaft and is a tight fit, and is retained in position by means of a cupped washer and a suitably locked cap screw. This construction permits of easy removal for replacement, without disturbing the rest of the assembly.



Russel motor bus rear axle

Washington in Two Models, Continental and Falls Six-Cylinder Engine Used



Washington Six mounted on 116-in. wheel base chassis

THE "Washington," manufactured by the Washington Motor Co., Eaton, O., is of medium size, having a wheelbase of 116 in. Two chassis models are offered, both having six-cylinder engines; one being the Continental 7-R, with a bore and stroke of 3¼ by 4½ in. and the other is the new model 3⅛ by 4¼ in. One standard style of body is offered, this being of the sport type, five-passenger, but obtainable with a factory built winter top of the California type if desired.

The car is unusually low by virtue of a new and patented spring suspension system.

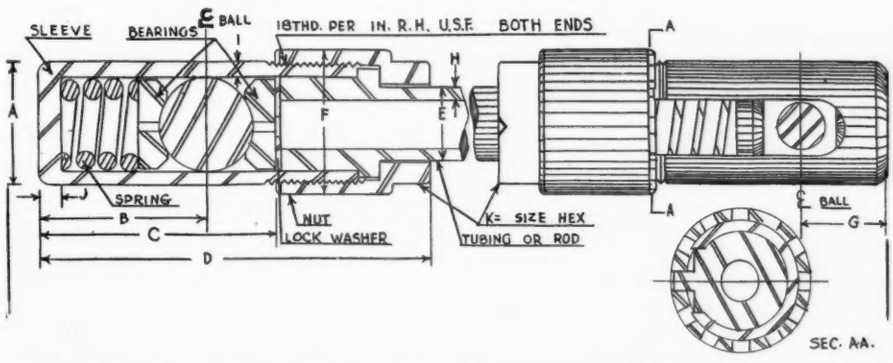
The rear spring is different from other cantilevers in that it is hung inside of the frame rails, yet a standard width is used between spring pad centers where the springs are secured to the axle.

The fuel system consists of a 16-gal. rear tank in which is carried a reserve compartment, a Stewart-Warner vacuum feed tank and a 1¼-in. Columbia carbureter. The carbureter is of a new design, in which is incorporated an electrical heating element as a part of the main fuel nozzle.

The power transmission system consists of a 10-in. Borg & Beck clutch and a Warner three-speed transmission. The universal joints are made by Arvac, suitable for oil lubrication. The axles are of Columbia make with special provisions to suit Washington conditions. Tires are of Goodyear cord construction, 32 by 4 in. size, plain tread on front, non-skid on the rear.

The electric system is composed of Remy ignition with Bijur starting and lighting in two units. An Exide battery is used having a 100-ampere hour capacity. A glass faced ignition and lighting switch is used and the other dash board equipment is in complete harmony. An eight-day luminous clock is furnished with the car.

New Design Steering Drag Link



A NEW design of steering drag link has recently been placed on the market. No welded joints are used and the seamless tubing is upset at the ends and machined with a back taper. The spring construction is conventional and the sizes are determined by the customer's specifications. The steel stamper bearings are pack hardened to resist the wear of the steering arm ball. The sleeves which are thimble-shaped stampings are machined with an external thread and are provided with a slot sufficiently wide to allow free action of the steering arm ball.

The nuts which retain the sleeves are placed on the seamless tube before the last end is upset. These nuts are screwed on to the end of the sleeve and are provided with an inner shoulder which together with the sleeve is drawn up tight against the tube end ring boss. Further tightening forces the sleeve down against the back tapered end of the tube where it is rigidly locked. A modified star type of lockwasher is utilized to prevent the nuts from working loose.

This construction permits of a very short overhang from the center of ball to end of sleeve due to the short distance from the ball center which is possible because of the short closed end sleeve. The ball opening angle is adjustable to permit installation on either right or left side.

The weldless link is manufactured in four standard ball sizes as follows: "I" one and one-eighth inch, one and one-quarter inch and one and one-half inch, by the Smith & Johnson Mfg. Co., Cincinnati. The sketch clearly shows the construction of drag link with a section through the locking washer at "AA."

Movies As a Sales Stimulant

THE movies may not have any direct bearing on the retail automobile business but there is an occasional picture that may help, as in the case of Howard A. Shell, Chicago dealer, who recently took a fleet of used cars from his display rooms and ordered his salesmen to drive them to a neighboring theater where a popular movie hero was showing in an automobile race picture.

Of course, the permission of the management was necessary in "putting over" this little sales stunt, and, with this obtained, Shell proceeded to try out his idea.

Each car had a sign on it reading, "Ask for a demonstration," and the cars were parked along in front of the theater. The salesmen were instructed to pick the most likely prospects and drive them to their homes. There was no mind-reading necessary on the part of the salesmen, however, as the prospects came up, asked their questions and were taken to their homes.

On the Monday night, after the picture had run one week, Shell reported 12 cars sold, an average of a little better than one a night and "the most likely bunch of prospects you ever saw." Shell is now an enthusiastic booster of Wallace Reid, the star "salesman" in the picture who helped him with his used cars.

FUTURE DELIVERY ORDERS PLACED

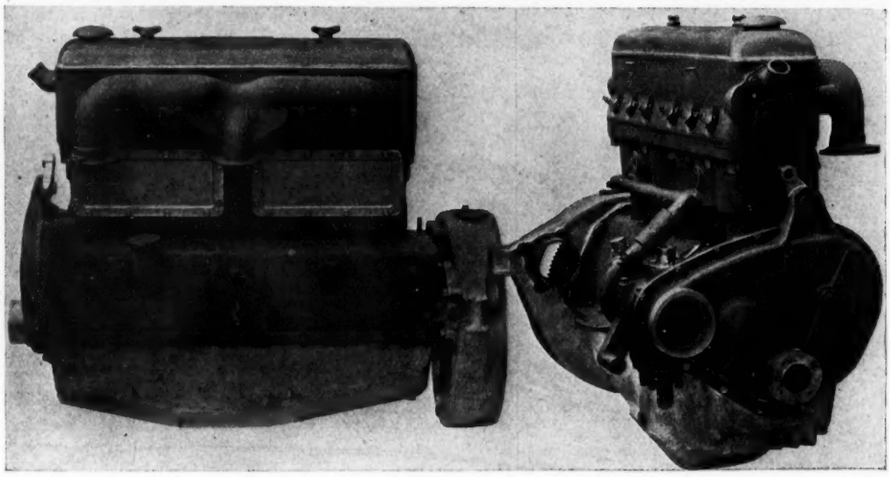
Philadelphia, March 25—Roller bearing manufacturers state that for the first time in a year and a half orders are being placed for future delivery. Equipment is being improved and new machinery ordered. Business in some cases has almost doubled in the past few months and covers a wide range of products.

Lubrication System Feature of New Weidley Engine

THE new Weidely Forty Point Bulldog engine is a six-cylinder, overhead valve, 3¼ by 5 in. type developing 63 hp. at 3000 r.p.m. The unit is also provided in 3⅜ by 5 in. size and is made in conventional installation type employing the No. 3 bell-housing for a unit powerplant. The six cylinders are block cast of cast iron with the crankcase cast integrally with the cylinder body and with a detachable head and an aluminum underpan.

The piston material is cast iron and the pistons are dome top shape. The clearance of the piston ranges from .002 in. to .003. The piston pin is fastened in the piston, the bearing being in the upper end of the rod.

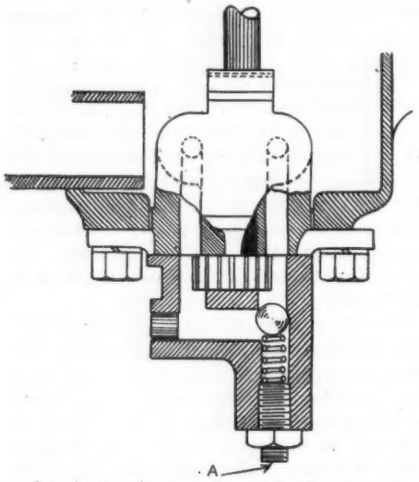
The main crankshaft bearings are faced with babbitts with brass backs, their dimensions being, rear and center 3 in. long by 2⅜ in. in diameter; front, 2¼ by 2⅜ in. diameter. The end thrust is taken on the front bearing.



Two views of the Weidley engine. The hot-spot manifold will be noted on the left. Right, end view showing location of accessories and oil relief adjustment just below fan pulley

Weidley Pressure Lubricating System

The lubricating system is by pressure. The oil pump is a self-priming, gear type mounted on the side of the upper crankcase where it can be removed without disturbing any other units. It is arranged to pump into the oil line only such oil as is required at a set pressure. The pressure relief valve is located in the pump and so arranged that all excess pressure is by-passed within the pump to the suction side, so that new oil is not taken from the pump until such



At A is shown the exterior screw and locknut by which the oil pressure is regulated

time as all of the stored up oil already in the pump has been used.

The oil is forced under pressure to a tube that connects with each of the three main bearings. The crankshaft is drilled so that the oil has a free passage from one end to the other and the connecting rod bearings are supplied with oil from the inside of the shaft. The oil tube which connects the three main bearings helps to distribute the pressure more evenly and eliminates the possibility of the system being made inoperative by the accidental plugging of one of the lines or even two, as any one, it is stated, will feed the entire shaft. Oil is forced through lines from the front main bearing to the accessory shaft bearing and to the hollow drilled shaft forming the bearing for the automatic chain adjuster from which the oil finds its way to the chain proper.

By means of another oil line and holes drilled through webs in the upper half of the crankcase an intermittent supply of oil under pressure is carried to the camshaft bearing and to the inside of the hollow rocker arm shaft, from which it is forced to the rocker arm bearings and through a hole in the rocker arm to the top of the push rod which is cupped to hold this oil. It then travels down the push rod to the valve tappet lubricating the ball on the bottom of the push rod.

The valve tappet is hollow and is cross drilled to allow the overflow oil to escape, lubricating the valve tappet guide and thence back to the crankcase. The piston and cylinder walls are lubricated by oil thrown off of the connecting rods.

The lubrication of the rocker arms is taken care of through a hole in the rocker arm to the top end of the push rod. This is cupped shape to hold the oil. With this system it is claimed that the entire overhead valve action is working on a cushion of oil.

The walls in the heated portion of the intake manifold is pocketed so that liquid gasoline will be held until it is vaporized. The water jacketed manifold within the head is held at a temperature which is designed to prevent the vapor from being again condensed.

An interesting feature of the engine is accessibility. For instance, the adjustment of the clearance in the valve mechanism is taken care of by removing two thumb nuts which hold on the cylinder head cover, lifting off the cover and turning the screw located on one end of the rocker arm, to the proper position and locking with a lock nut. This can be accomplished with the engine running. Grinding valves or cleaning carbon may be very easily accomplished, it is claimed, by removing the cylinder head and lifting off the complete head of the engine together with the manifold, rocker arms and all parts attached to the head.

Valve Grinding and Carbon Removal Facilitated

This head can then be placed on the work bench, the valve springs removed and the valves ground under the most convenient conditions. While the head is off, the entire combustion chamber is open and any accumulation of carbon can be removed. The oil pan can be taken off and any of the piston and connecting rod assemblies removed from the bottom of the engine when it is necessary to inspect piston rings or bearings.

The adjustment of the oil pressure valve is from the outside of the engine on the right front end, where it is taken care of by means of a screw and lock nut.

The oil pump can be removed from the bottom side of the crankcase. The oil drain plug is located on the side of the oil pan, where it can be conveniently reached. The oil screen of the sump can be removed and cleaned from the bottom of the crankcase without disturbing any other parts. The water pump can be removed as a unit by sliding off the rear end of the accessory drive shaft. The camshaft bearings are slightly larger than the cams, making it possible to withdraw the camshaft.

The Tractor Is Hunting Some One to Sell It

THIS Manufacturer Doubts if a Dealer Masquerading Under Any Other Name Will Put Over the Job—Recalls the Losses of Those Who Neglected the Automobile

AN interesting view of what a progressive tractor manufacturer thinks of the future selling of tractors is presented in the following talk by James A. Craig, president of the Samson Tractor Co., who gave this opinion in an address before the Wisconsin Implement Dealers at their annual convention. He said in part:

"As I look at it, what we manufacturers should be the most interested in at this time is to assist you dealers in organizing your business so as to become real farm operating equipment merchants. I am going to be very frank with you in stating that I do not think the organization as we know it, selling under the banner of implement dealers or automobile dealers or garages, and the manner in which these businesses are now conducted, meets the demands of the day when it comes to selling farm equipment; and I am frank to confess that I have been considerably concerned for some time as to just whether the implement dealers as a whole were going to arise to the occasion and save this business, which properly belongs to this class of merchants.

"You will recall when the automobile first came on the market how some of you rushed in and secured the agency for some good cars and soon were bitterly disappointed in the results you were able to obtain, particularly in regard to profits. I am old enough to remember very distinctly the different state dealers' convention 'resolutions' against handling automobiles. Some of the best implement manufacturers and dealers in this country appeared before you on your programs and urged you to leave this industry alone. It is barely possible that this was a wise thing to do, but when you lost the vehicle business out of your line, there dropped out one of the most profitable parts of your business, which you have never been able to replace.

"But have you stopped to reflect what is going to happen if you fail to meet the requirements necessary to market the present and coming farm equipment? It will not alone mean a loss of part of your business, but all of it, unless you perhaps are now combining the lines of hardware and implements and will be content to simply handle the small amount of horse-drawn implements that there will be a demand for in the future.

"I am well aware that there are many dealers today who are still questioning the permanency of the tractor and truck business, but I can only remind them that there were just the same persistent arguments put up that the automobile was a fad and would pass out like the bicycle. I simply want to ask, where is the man today who is making a fortune selling top buggies, surries and platform spring wagons, and what will you take for your profits in selling farm wagons in the last five years?

"I want to say to you from actual, personal experience, as being one who is paying the bills, that I positively know it is absolutely more economical to operate a farm with mechanical power as compared with horse power, to say nothing about the personal pleasures and advantages that go along with it.

"As you understand how the farmers' horizon has been widened by the use of the automobile, in a like manner his business advantages will be expanded by the use of a farm truck. Every good piece of road that is built and passes the doorway of a farmer makes that man immediately a prospective customer for a truck, and he can be shown conclusively that it is money in his pocket to buy one. As soon as you dealers appreciate these facts, we will at that time take a tremendous step forward in settling for all time that the implement dealer is the logical man to handle farm mechanical equipment.

"We manufacturers have got to lend you, this coming year, more personal support than we have ever done since the days after the panic in 1893. What I mean is that the volume of business we secure for next season is very largely going to depend on the personal solicitation to secure each individual sale. The farmer is in such a frame of mind that he is not going out looking for new equipment, particularly of the latest design, especially when it comes to paying so much more than for the farm tools he has been accustomed to using.

"You must be fortified with full information that will enable you to show conclusively why it is economy for him to buy this higher-priced equipment. You must also be prepared to show him that at the price he has got to sell his products for, even under the most favorable circumstances this coming year, he must produce them at the least possible cost.

"There is absolutely no other way out of it. When you read in the papers that the only way we are going to be able to increase the price on the very backbone crop of this country—corn—is to restrict the acreage for this coming year as much as 30 per cent, it is sufficient evidence to prove to any thinking man that no one is expecting a sudden return to higher prices on farm products.

"When men like President Howard, of the Farm Bureau Federation, make public statements that the day has arrived when the strictly grain farmer must change to a combination of grain and livestock farming if he is to survive in the future, it is high time we should sit up and take notice of the changes that are immediately before us in farm equipment.

"You dealers will be compelled not alone to handle farm implements, but must include barn equipment, lighting plants, water system, household power equipment and other things constantly being added to the line. The volume of business for this coming year is going to be maintained by the variety of things we sell rather than the quantity of any of our articles.

"I hope you Wisconsin dealers will make the most of your opportunities and that the signs over your buildings will change from 'Implement Dealers' to 'Farm Equipment Dealers,' and thereby announce to the world that you are the men who are going to be the merchants in your communities for this new line of goods."

DANSVILLE CLUB ELECTS OFFICERS

Buffalo, N. Y., March 28.—The Automobile club of Dansville at its annual election named these officers: President, A. I. Dennegan; vice president, L. H. Heckman; secretary, Frank J. Lemen; treasurer, Gail M. Young.

REORGANIZATION PLANNED

New York, March 25—The Consolidated Distributors, Inc., formerly the Times Square Automobile Co., which went into receivership, is to be reorganized through the formation of a new corporation if a plan being considered by the reorganization committee is adopted.

Spring, Automotive Maintenance and Business Expansion

THESE Three Make a Consistent and Profitable Combination—Some Things the Dealer Can Do to Hook Them Up Are Outlined Here

SPRING might be called the great opener. Certain sections of the country are opened after being closed all winter by snows and frozen roads, hearts are opened to the song of life and, what interests us all, pocketbooks are opened.

The things that were good enough when the weather was foreboding suffer by comparison with the eternal newness of Spring and the rejuvenation of Mother Earth inspires in everybody the impulse to repair, fix up, brush up and fit into the new picture with pride.

Cars that were neglected during winter use must now be attended to. Service is the co-worker of Spring in loosening the purse strings. Accessories are needed, "Ask 'Em to Buy,"—suggest a new paint job—"how about fixing the top Mr. Car Owner?"—"better stock up with a few spare tires now and be prepared when those old casings give up the ghost."

Money is and will continue to be spent and the man who has once experienced the pride of ownership, convenience and utility of individual transportation will go without many things to keep his car and keep it a thing he can enjoy.

Pocketbooks are opened, business is there, who is going to get it?

Of course, in the spring, business just naturally comes in and will keep almost every shop busy with its present equipment but why be content with just keeping busy on the work that may drift to the door without effort or solicitation? Get this natural, easy come business but don't stop there; get more than you can handle and then expand your organization and equipment to meet it and hold it. That's the way prosperous automotive businesses have been built up—expansion to meet demand created.

10,500,000 automotive vehicles registered in 1921!

The job of maintaining them is not a side-line or after thought of selling them but a real, man-sized industry, paying real profits to the establishment equipped to handle it with time-saving equipment and an efficient corp of mechanics and helpers.

On this page are reproduced various methods employed by dealers and garagemen to create business. The inspection report is an excellent example of how to interest an owner in having his car kept at top notch efficiency at the minimum cost.

By virtue of modern motor car design, it is not often they will refuse to operate even though there may be a number of moving parts that require attention and which, if not attended to, will ultimately affect their operation. And because they will operate, many owners do not realize that they should be periodically inspected by an expert diagnostician. To the average motor car owner, the car may be running sweet and pretty while a test by an experienced mechanic would reveal maladjustments and misalignments that are piling up heaps of trouble for a later date, if not corrected.

That is where the merits of this in-

An Inspection Report That Will Bring in Service Business

INSPECTION REPORT Date _____ 19____

Name _____

Address _____

Phone No. _____

Make of Car _____ Model _____ Car. No. _____ License No. _____

Date last Inspection _____ 19____ Speedometer Reading _____ Total Mileage _____ Mileage last Inspection _____ Net Mileage _____ Run in _____ Months _____ Days

BRING THIS INSPECTION SHEET TO US, WE WILL INSPECT AND FILL OUT FREE THEN YOU CAN DECIDE IF IT IS FIT FOR A LONG RUN AND ADVISE US THE WORK YOU WANT DONE.

TO HOLLYWOOD GARAGE

MOTOR	Spark plugs	REAR AXLE
Is motor tight in frame?	Wiring	Bearings
Compression	STEERING GEAR	Are wheels in line?
Do valves need grinding?	* * Connections	Condition of brakes
Carbon	Is it being properly oiled?	SPRINGS
Are timing gears noisy?	Is there too much lost motion?	Are clips tight?
Piston Rings	SERVICE BRAKE	Do leaves need oiling?
Connecting rod bearings	HAND BRAKE	GREASE CUPS
Main bearings	FRONT AXLE	Are all cups filled?
Push rods	How are wheel bearings?	GENERATOR
Is motor kept clean?	Are wheels in line?	Does it show proper charge?
OILING SYSTEM	Is axle in line?	Chain tension
Oil level	CLUTCH	STARTING MOTOR
Pressure	Does it grab?	Condition
Circulation	Does it slip?	BATTERY
COOLING SYSTEM	Are the rollers greased?	Was it properly filled?
Radiator	Is thrust bearing oiled?	Gravity test
Pump	Propellor shaft bearing	TIRES
Are connections tight?	Universal joints	Pressure
Is fan being lubricated?	Are universal joints greased?	Front R L
Is fan properly adjusted?	TRANSMISSION	Rear R L
CARBURETOR ADJUSTMENT	Condition of gears	LIGHTS
Carburetor leak	Condition of bearings	Front
Gasoline line	Condition of grease	Side
IGNITION SYSTEM	DIFFERENTIAL	Rear
Timer	Condition of gears	
Coil	Condition of grease	

Time required _____ Hrs. _____ Quarts Cylinder Oil _____ Pounds Cup Grease _____ Pounds Trans. Grease

_____ Mechanic

O. K. _____ Foreman

If there are any additional notations or recommendations write them on the reverse side, and put an "X" here. _____

This form is intended for mailing to the car owner with the offer that his car will be inspected free. An order to have the work done usually results after the customer reads what his car needs

Terminal Garage

THE UPTOWN-CHICAGO GOODYEAR SERVICE STATION

4454 Broadway

Chicago, Illinois

February 15, 1922

Mr. Walter E. Anderson,
Chicago, Ill.

Dear Sir:

The other day one of our customers drove into our garage in his six months old car.

"There's a creak somewhere in the cowl. I've been to another place five times to get it fixed. They have tried lubricating with grease; they have shaved the wood where it is fastened to the metal body -- then they packed felt strips in. But the creak is still there. Will you fix it?"

We told him "Sure", and called to a boy, "Get Pete." Now Pete was busy somewhere, stretched out under a car. But he came with his few tools in a rough wooden box.

"What's the trouble?" he asked.

"Creak in the cowl."

"Which side?"

"Lower right."

Pete put his box of tools down, stepped on the running board and said, "Start her up." The car ran fifteen feet. Pete said, "Stop her." He raised the hood, put his hand inside for a moment, bent a piece of metal in his fingers, shut down the hood, took his tools and said, "All fixed. Go ahead."

And the creak was gone.

We know our business. If you want expert service, serviceable Goodyear tires or dependable accessories, come in. We're busy but we are ready and anxious to take care of you.

Yours very truly,

TERMINAL GARAGE

Fred Daniels Mgr

GOODYEAR

Dist. F.E.Daniels
A.F.
P.S.--Bring your tire troubles to our red-headed tire man.

A letter like the above is sent out several times a year by the Terminal Garage. This is interesting and chatty copy and has a subtle influence that means much in the success of this company

GOODRICH TIRES — PARTS FOR ALL MAKES OF CARS

CONOLLY MOTOR COMPANY

WASHINGTON AND HULL STREETS

ATHENS GA

Dear Sir:-

Are you satisfied with the service you have been getting on your car?

Is the proper interest being taken in your car?

We are the authorized distributors of the car that you are driving, and carry a large stock of parts. We have a vital interest in seeing that this car functions properly. That it does, means a satisfied owner; and a satisfied owner helps us towards bigger sales. Mr. Luther Epps is actively in charge of our shop.

We do not know where you have been taking your car. Perhaps you have been getting good service. But is it not true that the authorized distributor should naturally take more interest in you than merely some garage-man? Our profits are not dependent on our shop. In fact, we do not even attempt to make a profit from this department. We try to make our shop an adjunct for pleasing owners, and a profit on our work is not considered. This, of course, could not be true of the ordinary garage owner. He must, of necessity, make a big profit if he remains in business.

Think this letter over. It has a great deal in it, and is worthy of some contemplation. We can save you money, and give you better service, because we are prompted by the proper motives. Below is a certificate, which entitles you to two hours free service at any time within thirty days from date of stamp. There are no "strings" attached to this offer. You bring your car in and tell our foreman what you desire done. He will do the work and if it does not require but two hours time, it will cost you nothing. If the time required is greater than the allowance, you will only be charged with the difference at the rate of $1.00 per hour.

Very truly yours,

CONOLLY MOTOR COMPANY

PHC/E

FREE SERVICE CERTIFICATE.

Shop Foreman: The bearer of this card is entitled to two hours work on his car without charge. This covers any form of labor, but does not include parts. This offer good only 30 days from this date

CONOLLY MOTOR COMPANY.

This letter leads off with an interest catching line and the rest of the story bears a real message to the man owning the car this company sells and services. A free two-hour service offer usually brings a trial job

spection report are quickly realized. After a car has been inspected and its condition tabulated on the form the car owner sees the logic and economy of having the trouble corrected while it is of a minor nature.

In this plan the inspection is free but almost invariably there is something that must be repaired or adjusted and few owners will continue to drive their cars conscious of the trouble that is brewing as result of not having it fixed when it was called to attention.

Free Towing Plan Brings in Maintenance Business

The free towing application is another example of what a dealer can do to bring work into his place of business. Before every owner is the possibility that some day he may have to be towed in as a result of an accident or breakage of some vital part. This idea takes advantage of that possibility to have the car owner file his name for this free service should he ever need it. When an owner places himself on record for this service and is towed in as per agreement, it is then the garage profits. Of course the customer will have the necessary repairs made at an establishment that was far seeing enough to make such an attractive bid for business.

The Terminal Garage, Chicago, sends a letter to its list which breathes the Spirit of Service. This company has been the author of several notable types of business pulling correspondence.

EDGEWATER 8673 — 2 PHONES — EDGEWATER 8674

HOLLYWOOD GARAGE

CHICAGO, ILL.

5656 BROADWAY

Free Towing Application

To every AUTO OWNER who fills out Application below we will tow in FREE within 9 miles. But you must fill out this application to get this service.

We can handle your car no matter how badly damaged or if it is in a ditch, with or without wheels.

Our Mechanics are the very best (No Helpers) and your car can be put in First-Class condition, as we are fully equipped to handle any kind of Repairing. We have experts for the Motors and experts for Starters, Generators and Lighting.

Willard Battery Agents — **Hollywood Garage**

FREE TOWING APPLICATION

Name.....

Address.....

Make of Car.....

Style of Car.....

Motor or Serial No.....

To HOLLYWOOD GARAGE
5656 BROADWAY

This idea could be used profitably by many garages. It is a free towing offer within a specified radius. The car owner has the work done by the garage that towed his car in

It is the sort of a letter which, once the prospect has read the first line, he will read it all; the novelty of the style will hold his interest. The prospect will unconsciously make a mental note that here is a service company that knows its business and how to sell its service.

The incident narrated in the letter is one of a type that happens in every garage but the trouble is that most maintenance shops keep silent about their good points and let the kicker go abroad to tell of the bad ones.

Two-Hour Service Certificate Offered

The letter by the Conolly Motor Co., is another type of interest compelling copy. This company makes a bid for business on a basis differing somewhat from the ordinary, lack-lustre send-your-business-to-us request but offering no sound argument as to where you would benefit by so doing.

This company bases its claim for business on a direct appeal of ability to supply exceptional service for the car the reader is driving. As an inducement to have the prospect give the service an early trial, in the last part of the letter is included a free two-hour certificate; replacement parts, of course, to be paid for.

Tooldressing

A Difficult Part of Automotive Maintenance

Knowing the Metal, Knowing the Use of the Tool, Knowing the Means to Get the Results Wanted—this is the part of the smith's trade that is know-how and very little muscle

Thorough Study and Much Experience Are the Two Absolute Essentials to a Successful Tooldresser

By R. C. JONES

IF YOU have an old cold chisel, a veteran bearing the scars of many encounters with obstinate jobs, you could ask for nothing better to start the practice of tool forging and tempering. You will lose nothing if you spoil it; if you succeed, you will have saved the cost of a new tool, and added much to your knowledge.

Let us take the steps one by one, explaining each as fully as possible as we proceed. Only a moderate fire is needed for tool dressing. Fit a pair of tongs to the battered end of the chisel, and put it in the fire, blowing gently. A gentle application of heat is desired because none of the steel is overheated before the remainder has had a chance to reach the proper temperature. If the fire is too hot, the edges of the chisel will have all the carbon burnt out, reducing them to wrought iron again.

When a good working heat has been reached, draw the edge to its proper shape with the hammer, and cut away any feather that may remain, leaving the cutting edge blunt, about one-sixteenth in. wide. As the last of the red heat dies down, give the steel a few slow, moderate blows, very carefully placed, with the flatter and sledge. These blows have the virtue of refining the grain of the steel at the cutting edge, and making its temper much more soundly and evenly.

Now raise the chisel to a full cherry heat, about half its length, and plunge it into the tank, working it rapidly up and down, and holding it, when black, beneath the water until perfectly cold. It is now hardened to a degree that makes it brittle as glass. It will splinter if used. On testing it with a file you should find it too hard to show traces of the tool.

That would be an ideal condition to have it in if it were not for its liability to shatter at the first blow. It must be softened to a point that will permit enough toughness to return while it is still hard enough to cut the metal it is to be used on. This is tempering, in the common sense of the word. Another sense will be defined later.

Tempering a Delicate Process

Provide yourself with a chunk of emery wheel, a coarse whetstone, or a strip of coarse emery cloth tacked to a smooth flat stick. Again heat the chisel to a cherry red, and again quench it quickly, moving it rapidly up and down as before. Just before the vibrations caused by the water boiling have stopped, take your stone or emery stick in your right hand, and your tongs in your left. Lay the chisel on the edge of the tank, and rub one face clean of dirt and scale. You will see a succession of colors flowing along the cleaned surface.

The leading color is always a pale yellow, followed by a band of deeper yellow or straw, which is succeeded by brown, light purple, dark purple, light blue, dark blue, deep violet, in the order named. The last two are never used on tools for working metal, since they indicate a softness that soon surrenders to work on white pine. When they appear, the temper is completely drawn, and the whole job must be started over again.

These colors are an absolutely reliable indication of the degree of hardness the steel has reached. In cooling the chisel the second time, it was hardened to its greatest degree, but the body of the tool being above the water, remained hot. Now the heat of the body is radiating down into the edge again, gradually annealing the steel as it travels. The change in color is due to the formation of a thin coat of oxide, which changes color with the advancing heat as it travels.

"Catching the color" means plunging the tool completely under water when the proper color has reached the cutting edge, and moving it rapidly about, to make the cooling as swift as possible. Which color to catch depends upon the use for which you intend the tool. The chart of colors given farther on will tell you. If the cooling is too slow, the heat is apt to "run" farther, and the chisel will be softer than you want.

Boiled water, or clean water that has been much used for cooling, is best, because the air has been driven out of it. That seems to improve the texture on the surface of the steel, probably because absence of air causes the boiling of the water in direct contact with the tool to be less violent, hence the contact is closer, and the heat in consequence more rapidly absorbed. Many old-timers add salt to their tempering water, but the writer has never noticed any superiority of results from doing this.

The reason for moving the tool rapidly up and down when hardening and tempering is to distribute the strains evenly throughout the metal. It is plain that the surface, cooled more rapidly than the interior, is greatly contracted, while the interior is much expanded. They are pressing powerfully against one another. If this pressure should be concentrated at any line, fracture would be bound to occur there. Frequently a tool held still in the water or oil will break square at the line where the liquid's surface surrounded it. This may happen at the moment of cooling, or the tool may show no sign, and snap when put in service, very probably with injurious consequences.

The writer has seen a hot cutter apparently sound, fly into pieces when dropped a few inches onto the anvil. Investigation showed that it had been allowed to soak in the fire long after it had been heated completely through, burning out the carbon, and that it was full of water cracks, as well as having a definite line of cleavage where it had been held still in the water during the final hardening. Just about all the wrong things possible had been done to that tool.

Other Dangers to Avoid

Seams, laps and water cracks are the bane of the tool-dresser. The two first are beyond his control—the result of a steel-maker's error. But a water crack is the fault of the tool-dresser. Laps are flaws in steel caused by folding under the rolls or hammer, another name for them is "cold-shut."

The surfaces of a lap are smooth and the lap itself runs in the direction of the bar. So does the seam, the only practical difference being that the seam is caused by a bubble of gas becoming imprisoned in the metal, and being extended under the rolls.

A seam is seldom very long, and its surfaces are usually coated with oxide. The only way to rid the steel of it is to reject the whole piece, if the flaw is large enough, or to split it away, should it lie near enough one side to make the remainder worth saving.

Water cracks are the flaws most frequently met with, and the most troublesome until their cure has been found. Their walls are always rough and coarse-grained. They almost always show the temper colors. They are the result of uneven heating and quenching. The cure for them is always more careful management of the blower, watchfulness, and care in dipping.

By tempering a few pieces of steel at uneven heat, and breaking them under the hammer on the edge of the anvil, water cracks can be found, and identified by the differences in grain between their surfaces and the surfaces of properly tempered pieces.

Shape of Tools to be Considered

The cold-chisel is about the simplest form of tool (chisels of stone were in use 50,000 years ago) hence it is always the first tool to be used as a subject when learning tempering. But the great variety of shapes in common use calls for considerable judgment on the tool-dresser's part.

Simple, one-edged cutting tools, such as lathe and shaper bits are practically chisels and the same method applies to them. Yet they have a wide variety of shapes, and each must be handled more or less individually. As a general rule, the thickest part of the tool is immersed first. If the thinner part should be dipped first, it becomes fixed while the thicker is still contracting, so the stresses setting up in the thicker part will force distortions or cracks in the thinner. But when the thicker part first enters the water, its temperature is reduced to nearly that of the more rapidly cooled thinner part, so the final cooling is at practically the same temperature throughout the mass. This, of course, tends to equalize strain and prevent spoilage.

Methods of Heating

So far the only fire described has been the common open fire used for general work. For hardening and tempering simple tools, such a fire is quite practicable. Other methods must be used in other cases. The first of these is the hollow fire. It is built by setting a round tapered bar into the tuyere, like the cork in a bottle, extending up about eight or ten inches. Very wet coal is thrown around this, and tamped four or five inches deep with the hammer striking on a flat piece of iron. When thoroughly compacted, withdraw the rod, and build a pile of parallel eight or nine inch sticks of pine or other soft wood mingled with shavings over the hole.

Over all this, but leaving a hole large enough to admit the work in front, heap wet coal, and tamp as before. Then light the wood and blow until all the wood is burnt away. Soon the heat will eake the coal into a solid mass, and you will find you have an efficient, if small, reverberatory furnace. With it a very even heat can be applied all over the metal, and very close control kept of it. The size of the hollow may be varied to suit the work by changing the dimensions of the woodpile.

For small articles composed of many thick and thin parts, a pot of melted lead is a common and excellent medium for heating. Its temperature must be maintained at equality throughout by frequent stirring. Though the surface may be at the correct bright red, the lower strata of lead are very apt to be at a higher heats, which are communicated to the work, with resultant spoilage. The excellence of this method for articles of irregular shape is that no matter how long it may take to heat the larger parts of the work, the smaller parts are never raised to too high a heat.

Neither can air or burning gases come in contact with the work to form scale. Since it is impossible for the most experienced smith to reach these results with the fire alone, the lead-bath method is to be highly recommended.

Very small articles that could not be put into the fire without certain spoilage may be treated in one of three ways. Place in a heavy sheet-iron pan about an inch of powdered charcoal (burnt leather scraps, or wood charcoal) place the work on this, and cover with the powder. Along with the pieces to be tempered, insert a few test-pieces of the same shape and size. Heat the whole to redness, holding at that heat until the test pieces show they are the proper temperature clear through. Then withdraw the work, and temper as usual.

The second method is that of laying the work on a piece of hot iron, turning the work rapidly until it reaches the proper color, then catching the color. A red-hot iron ring, or a length of red-hot iron pipe may be used to avoid turning the work over—sometimes a hard thing to do. The ring method is valuable for rehardening miller-cutters, the pipe for drills, taps and reamers.

Die Hardening Most Difficult

Hardening dies is probably the most delicate job offered the smith. The smallest amount of scale on the working surfaces ruins the die—and anyone who has paid to have a die sunk will appreciate what this means. Therefore, it is best to gather much experience before attempting this job. Every means must be used to preserve the working surfaces from contact with the fire, or with the air while hot. Likewise the hardness must be equal throughout, especially all over the working surface. If the body of the die is soft, the face will be driven down into it. If the face is unequally hardened, a part will wear past usefulness quickly, while the remainder may be good for thousands more impressions. Neither can any but the smallest dies be handled successfully in the hollow fire, larger ones require a specially constructed furnace.

Here again the charcoal and sheet-iron pan come into play. First an inch or two of charcoal, or more, according to the mass of the die, is tamped into the bottom of the pan. The hollows of the die are tamped full, a little tar being mixed with the charcoal to act as a binder. Then the die is pressed face down into the charcoal bed, and more powder tamped in all round it, either to the level of the back of the die, or the edge of the pan, whichever is lowest. Complete contact with the charcoal all over the working surface is absolutely essential. Place the whole in the fire, and let it soak a little, until the charcoal is heated through. Then use the blower very sparingly, until the die reaches the proper temperature. Forcing the blast will surely burn out the pan and ruin the die. Have ready a pair of U-shaped tongs, longer than the depth of the cooling tank, with their points turned inward. Remove the pan and die to the tank, lift out the die with the tongs and instantly soak it under, **holding it completely below the surface until cold.** Don't drop it to the bottom and let it lie there. Keep it moving about. To do so is almost certain to warp it, and to lift it from the water is equally certain to crack it. When it is thoroughly cool throughout (which is a good two minutes after it is comfortable to touch), lift it out, dry it thoroughly, and replace it in the same box, packing the warm charcoal about it as before. Replace it in the fire, and watch it closely, until the visible part reaches the next shade preceding the desired color. Then remove it as before, wait until the proper color arrives, and quench instantly as before, in tempering water at about 60 deg. Fahrenheit.

Spring Tempering

Toughness and elasticity are the two requisites of a spring, so the high tempers given tools cannot be used on them. That calls for different methods of heating and these in turn, for different materials. The great number of small springs used in automobiles, as well as the indispensable chassis springs, makes this part of smithing extremely valuable to the automobile repairshop smith.

A quantity of lard oil is needed. When the spring wanted has been forged and hardened, a great deal of difficulty is met when tempering by the tendency always to heat the spring too much when using only the fire. This the lard-oil avoids. Fill a pan large enough to contain the spring conveniently with lard oil, and having fastened the spring to a convenient piece of wire, put it in the pan, and the whole on the fire. When the oil boils, lift out the spring. If it does not burst into flame, or burns yellow, replace it, and try a moment later. As soon as the spring bursts into white flame on being removed

from the oil, let it burn out, partly quench it, rub it quickly with your emery, and observe the color. As soon as the proper one appears, catch it.

This method can be used for all small steel springs. A great number can be tempered together by regulating the temperature of the oil to keep it from burning entirely away while the springs are in it. Large springs may be tempered after hardening by smearing them thickly with lard oil, and holding them over a brisk fire until the oil catches fire, and burns off. Immediate and complete quenching will, with few exceptions, result in a spring leaf of correct resiliency and long life.

Recalescence and Refining

In one of the earlier articles it was mentioned that steel makers have to treat each batch as individually as a mother treats a child. This is literally true, although they can hold any batch within close limits of analysis. The smith must deal with his steel even more individually—every little piece has a nature all its own.

In all carbon steels there is one certain heat at which a steel of that analysis will have its finest, most durable grain. To know that heat, and (when making tools), harden at that heat, is the chief aim of the smith. When steel is cooling down from a high heat, a certain point is reached at which the steel seems to cease cooling, and give off, or increase its heat. Take particular note of the color of the steel when it reaches that point, and while working with that batch, harden at that temperature.

A very interesting experiment can be made by marking a bar at three-inch intervals and heating it to the burning point at one end, graduating the heat section by section, down to cold at the other end. Quench the whole bar suddenly and completely. Break the tip off a file, and scratch the bar heavily from the cold end towards the hot with one of the freshly broken corners.

At a certain point it will be found that the file refuses to bite, and slips over the surface. This is the point of recalescence. Now break the bar at each of the marks, and observe the grain of the steel. Break it also at the point of recalescence. Here the grain will be found the finest, and with the least lustre. The steel here has been **refined.** When hardened at the temperature shown by this section while hot, steel from the batch will make satisfactory tools.

Even though they be tempered, and used on hot work that draws the temper in a few minutes, the tool will retain its fine grain and durability, **except** it be heated beyond the point of recalescence. That is why hardening is always done at higher heats than tempering, and why hardened steel may be retempered time and time again without losing its fine working qualities.

Steelmaker's "Temper"

Temper means something to the steelmaker entirely different to its meaning to the smith. The steelmaker grades steel into tempers according to the percentage of carbon in the steel. They are as follows:

Very high	over 150
High	100 to 120
Medium	70 to 80
Mild	40 to 60
Low	20 to 30
Dead soft	under 20

One hundred and fifty carbon means one and one-half per cent of carbon (1.50 per cent). Forty carbon means four-tenths of one per cent (.40 per cent), but the figures are spoken as if the decimal point were not used. Many steelworkers use the steelmakers' terms to denote the degree of hardness the steel has been given by heating and quenching. It is better to use the name of the color at which the steel was quenched, since it avoids confusion, but as this is seldom done it is always best to find out which meaning the speaker intends.

A Clean Surface Imperative

Whenever a piece of steel is to be hardened, it is essential that the surface be thoroughly freed from oxide and decarbonized metal. On small work the removal of a sixteenth of an inch, or even less, will be enough. On work over three inches average diameter, nearly an eighth, and as much as three sixteenths on large work. This is because the oxide left by forging, and the skin of decarbonized metal beneath it will not harden. Hence a good bearing surface, or a fine cutting edge cannot be gotten. Filing is the best method of removing this skin, but is too laborious to be considered on a job of any size. Therefore, grinding must be resorted to. These things must be remembered when grinding—that the work be not crowded upon the wheel, and that the wheel be perfectly clean, and well watered.

If the wheel is at all glazed, it will produce a corresponding glaze on the steel. Under this glaze a skin of soft steel will remain after quenching. So after grinding, turn the ground surface to the light, and look for shine. If you find any, take it off with the file, and dress your wheel. The work must not be crowded on the wheel, or the surface will be found covered with small water cracks, which will, of course, extend with hardening, spoiling the job.

Annealing

Annealing is simply drawing the temper completely. There are two things to be sure of when annealing steel. The first is to carry the heat no higher than the point of recalescence; the second is to prolong the cooling as much as possible. The first is a matter of watchfulness. The second may be gained by several methods. Burying the steel in a dying fire, and letting the whole die out utterly, enclosing the steel in a tight box of charcoal, heating the whole to light red, and letting it cool in air, banking with hot sand, or merely cooling in the warm air of the shop. The higher the heat beyond recalescence, the coarser the grain of the annealed steel; the shorter the cooling, the harder will be the cold bar.

Color Scale

Temper	Color	Tools	
Very High	Light straw	gravers hammer faces paper knives	small turning bits planer bits brass scrapers
High	Straw	milling cutters boring mill bits screw-dies taps chasers dies reamers	drawing dies leather-cutters inserted saw teeth rock-drills punches knives planing & molding cutters
Medium	Brown yellow	gouges twist-drills drifts	plane-irons auger-bits
Mild	Light purple	edging cutters	cold chisels for steel
Low	Dark purple	axes cold chisels for wrought iron carpenters' chisels springs wood saws	gimlets butcher saws needles hack-saws screwdrivers
Dead soft	Violet to black	tension rods	pinch bar middles

It was the hope of the writer that a little space might have been given to the forging of various smith's tools in this space, but the facilities are too limited to permit dealing with what is after all, a minor issue. The application of the principles laid down in these articles will enable the ingenious workman to equip himself with whatever is necessary.

A Final Word

A famous writer, describing the growth of the steel and iron industry said: "Up to the middle of the eighteenth century the working of iron and steel was limited by material and equipment to handling small amounts not more than two or three tons at a time. It was the work of a craftsman." It was, indeed, the work of the craftsman. Perhaps only the master toolmaker works as intently with mind, eye and cunning hand together as does the smith.

It is because the automotive industry in all its parts is becoming a business of nut-tighteners, that these articles are written. At no time is a man better occupied than when he is working hand and mind together to produce something. It's the healthiest way of spending time. Likewise it makes an infinitely better workman of the man who does it. This reason is the least of those assigned for writing this series—perhaps it may be the greatest after all. Only the man who will start in and carry it through will ever find out. But he surely will have learned something.

A Judicious Use of Posters Helps Business and Morale

Give 'em the Air
BEARINGS SERVICE COMPANY
The Party who Loans Tools is OUT
BEARINGS SERVICE COMPANY
Good Service built this Shop and—
It's Still Growing
SHINE?
Wash and Polish while your car waits··and drive it away like new
BEARINGS SERVICE COMPANY
Howzuroil?
Get it Here
BEARINGS SERVICE COMPANY
The real boss here is the customer
BEARINGS SERVICE COMPANY

"OUR Motto is Fixing not Faking," is a mighty nice motto to have hanging in a garage if it is lived up to. There are two reactions almost bound to result from the display of mottoes of that kind—the building up of employe and business morale and the inculcation of confidence in clients.

The purpose of the Bearings Service Co. in supplying signs of this kind to garage men monthly is to accomplish just these ends. That these results are being accomplished is becoming more evident to Bearings Service with the presentation of each month's new epigram. Today there are upwards of 50,000 garages expounding these principles by posting these wall cards.

Furthermore the signs have the reaction of stimulating business, being a sort of gentle reminder of the "Ask-'Em-To-Buy" campaign of the Automotive Equipment Association. "Howzuroil" queries one of the posters from a place where customers are bound to see it, and "get it here" suggests a good way of doing it now.

"The Party Who Loans Tools is Out," on an equipment stand or in a prominent place in the business part of the establishment has resulted in many blushes but also in many sales. "Shine? Wash and Polish While Your Car Waits" helps to sell the laundry end of the garage.

MOTOR AGE

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Higher Ideals in Association Work

A NEW note in automotive association work was sounded when C. A. Vane, general manager of the National Automobile Dealers' Association, addressed the members of the Illinois Automobile Dealers' Association. Vane stated quite frankly in coming before that audience that he had nothing to sell them. He said that he had only information to impart. Then the speaker proceeded to explain the new membership plan of the N. A. D. A. He told of the inception of the "One of a Thousand" idea and the necessity of giving a longer life to the automobile dealer. He said that the great handicap on dealers, as a whole, today was that the big business concerns regarded the automotive dealer as entirely unstable, that too many of them failed after two years' operation.

The new plan, he said, was to select only those dealers who had been in business two years or more and who had the respect not only of their competitive dealers but of the business men of their community. He said that by a selection of this sort of men and by giving them some designation that could be displayed in their place of business it was the intention to point out to business generally the automotive dealer who had a reasonable chance for a long business life.

After this explanation Vane did not ask the dealers present to join the N. A. D. A. but he told them that if they were eligible for membership, the N. A. D. A. would be glad to have them apply for membership. He intimated to the dealers present that quite a number of applications had been filed that had not been accepted. He suggested that the dealers, before filing this application, consider well the requirements of admission, and, also, consider well the reasons for expulsion. The entire plan was presented to the dealers as a question of privilege not as an invitation to pay the admission fee.

The same note was sounded in the talk by A. L. Stewart who is identified with the Tire Bureau of the Quincy Automobile Trade Association. He said that two years experience of organization work in Quincy had placed a value on the membership franchise. He said that one member who had been expelled for business misconduct had made extraordinary efforts to regain his membership and after regaining this membership had been one of the best and hardest working members.

It is rather novel for an automobile dealer association to be operating on a plan that puts the burden of obtaining the membership on an individual dealer. Previously the question has been, "Have you got the entrance fee? If you have we want you."

Certainly this change in method indicates a much higher tone of association work.

Why Not Post Graduate Courses in Prolonging the Car's Life?

IT MAY be a harsh thing to say, but nevertheless true, that incompetence has accounted for more failures in the maintenance division of the industry than any other cause. The word is a generalization and applies to all forms of incompetency that are possible in conducting a maintenance depot. Such a station may be faultlessly equipped with the latest improvements but due to the incompetency of some individual in not demanding and securing a fair sale price for the work there results a deficit in the yearly statement.

This condition, when applied to the institution that sells and maintains motor vehicles, is usually the boomerang from car salesmen overselling the car owner through unreasonable promises. Another form of incompetency may arise in the case of the institution that is charging what is apparently a fair price for its services but, due to a lack of equipment which would permit a reduction in the total number of hours on any one job, is unable to meet the fair and legitimate competition of the better equipped depot across the street.

Incompetency in its most destructive form exists in the maintenance department when the workers are not qualified through training to do their tasks efficiently.

Any corrective measures which are brought into play to eliminate either of the two first mentioned cases will, if they are successful, finally find their objective in correcting the individual. The comparative incompetency of any individual in any organization contributes to the comparative inefficiency of the organization as a unit. Very few men are intrinsically incompetent but some are comparatively incompetent.

The lack of labor saving equipment is a disadvantage, just as much as the presence of an untactful salesman. Both conditions will hinder the delivery of profitable maintenance but an incompetent worker will not only hinder but will prevent its delivery.

The practice of medicine and surgery is considered a profession. The business of maintaining motor vehicles

has many things in common with medicine and surgery. Both depend upon symptoms to determine their course of action. By studying the symptoms of the human body, the physician and the surgeon are enabled to prescribe the proper medicine or to correct by operation the abnormal anatomy. The same study of symptoms enables the trouble shooter to locate the cause of improper functioning of the motor vehicle and the repairman to correct it.

Medical men who have practiced their profession for years often go to school again to improve their knowledge. This is called their post graduate work and their activities do not end there. They frequently attend clinics where the latest methods and experiments of their profession are conducted. The doctor without his library of medical text books is rare.

It would seem that in a business that bears so much resemblance, that these methods could be profitably applied in raising the standard of our maintenance work. Knowledge and experience are the best antidotes for incompetency. Each maintenance depot is the doctor's office to every motor vehicle in its vicinity. It is as vital in prolonging the life of the motor car, as the doctor is in prolonging human life.

The industry needs more competent maintenance men, if we are to have maintenance depots that are profitable to the dealer and satisfactory to the car owner. Why can't we have our own post graduate courses, our own text books and our own clinics and why can't we have more workers in our maintenance departments who will study?

As to Cartoons

MOTOR AGE has made a mistake and takes this opportunity to apologize to some of our readers for trying to slip over such an untechnical situation.

The truth is that we will have to pass the buck to the cartoonist, and cartoonists are very irresponsible beings. They were forever making Mr. Wilson win the war with a quill from the old goose whereas everyone knows he won it with a typewriter. We even doubt very much if Mr. Bryan ever rode a donkey or Mr. Harding an elephant, automobiles being much more popular with these gentlemen, but cartoonists continually show them doing these stunts, thus betraying their ignorance.

If our cartoonist chooses to put a monkey wrench into the hand of his mason, dress him in garage mechanic's clothes, start him building a structure with such foolish materials as co-operation, instead of mortar; good will, fair prices, honesty, courtesy, careful service, etc., instead of brick or stone, about all we can do is to apologize.

The 1923 Shows

AS HAS been the case in many previous years, the Chicago Automobile Trade Association came forward with the best suggestion of the 1922 show season. It was the Chicago Association that originated the idea of training all of the show salesmen for their work during the show. This plan was adopted by a number of other associations and some of them perhaps did an even better job of training their men than the Chicago association, because they had a precedent to guide them and they, also, had a longer period for the work of training the men.

However, Chicago is going to repeat this work next year and is going to do it much better than in 1922. Now, Thomas J. Hay, president of the Chicago Association, has a suggestion for 1923 that he is quite willing to share with all other show managers in advance. Hay proposes that one day at the show shall be known as "Factory Day" and on that day no local dealer or distributor shall be required to furnish any assistance at the display booth, that the personnel shall come entirely from the factory and shall be directed personally by the president or some other high executive of the factory.

Hay's idea is not especially to boost the attendance to the show by having these men whose names are so widely known present, but rather to have them meet the public and know what questions the public asks, the attitude of the public towards the car and all other such detailed information as can be gathered only by meeting the public. Hay asks that all dealers and distributors who think this program a good one lend assistance in bringing it to the attention of the factories.

Can You Afford to be Without—*a Lathe?*

IT is difficult to understand in these days when dealers and maintenance stations in general are trying to put their work on a higher basis how a shop can get along without a lathe in its makeup. It is true, many shops have gotten along without a lathe, but can they afford to do so much longer?

Where the shop intends to do a variety of work it certainly cannot get along without a lathe. If one make of car is being serviced and the parts replacement is quite an easy matter, then the exclusion of a lathe in the shop equipment may be justifiable.

It seems to be the experience of those shops which have installed a lathe that a larger volume of business is handled. Such a shop has a greater appeal and is in a position to do special work. A lathe makes possible the testing and truing of crankshafts, machining flywheels for shrinking on starter gears, making bushings, turning the tapers on propeller shafts and, with a milling attachment, a hundred and one other operations.

Some shop operators state that they have little call for a lathe, but they overlook the fact that with a lathe installed there is a chance to build up a call for it. Certainly the shop well tooled up has a better chance to do good work and more of it than the one with but a meager equipment.

The Dignity of Maintenance

WE WISH here to express commendation of a suggestion recently passed to Moon car dealers by Stewart McDonald, president of the Moon Motor Car Co. The note is self explanatory and needs only to be quoted here:

> "A great many people think the word 'service' means something for nothing, and the implied meaning of a service station is a station where they can get free repairs.
>
> "If the dealers around the country use the words 'Maintenance Department' or 'Maintenance Station' and speak of the Maintenance Division of their business, they would eliminate entirely this frequent source of argument, ill feeling and misunderstandings."

MOTOR AGE has long held this opinion and in its own way has sought to extend the use of the word, maintenance. We are glad to see an executive of the standing of McDonald give this encouragement to the movement.

Production Limited to Sales

Makers Not Building Up Reserve; March Shows Gains

Spring Retailing, Beginning Early Keeps Manufacturers Fairly Busy

NEW YORK, March 28—March will show a decided improvement over February in the manufacture and sale of motor vehicles. Orders already booked by makers of parts and materials assure a better business for April than for this month. Beyond April the outlook is uncertain but there probably are few industries which can look as far ahead as May 1 with assurance of satisfactory sales.

A few parts plants are running at capacity and a substantial number of them are producing at 50 per cent of capacity, or more. The total of sales by parts makers in February was approximately double that of January and aggregated the business done in March, 1921, which marked the renaissance of the industry after the slump.

The better business which is being enjoyed by parts manufacturers is due in part to the deflated inventories of motor vehicle builders but not all of it, by any means, can be attributed to this cause. It demonstrates conclusively that both passenger cars and trucks are being sold in much greater volume than at the same time last year. Neither branch of the industry is building up a reserve of completed vehicles and all makers are holding their schedules approximately to actual retail sales.

Spring sales at retail, in substantial volume, have begun nearly two months earlier than they did last year. Speaking comparatively, there may be a falling off after May, but a production total of passenger cars equal to 1921 is practically certain and the total of trucks will be substantially larger.

The tone in Detroit is immeasurably better than it was at this time last year and confidence has replaced uncertainty. This confidence is solidly founded and few manufacturers have extravagant hopes. They are studying their markets with the greatest care and making dealer allotments on this basis. They have learned that the agricultural districts will take a considerably larger number of vehicles than was thought possible only two or three months ago. The same is true of the export field.

Sane and intensive sales efforts are being made. Greater attention than ever before is being given to service questions and economy of operation. The industry now realizes that the buying public is "motor wise." This is an important factor when it is considered that a very substantial part of the business this year will be in replacements.

CLEVER SWINDLER SOUGHT

Chicago, March 28—The Chicago Automobile Trade Assn. has issued a warning against a young man who obtained possession of a new automobile from a Chicago dealer by a clever scheme. The young man presented a check in payment for the car which he wished to purchase. The dealer said he would have to hold the car until he could present the check at the bank. The car, ready to be delivered, was set aside in a back room and the young man went away. Later in the day the check was presented at the bank and turned down as worthless. Shortly afterwards the automobile was missing from the back room where it had been placed.

STUDENTS SEE "ASK 'EM TO BUY"

Chicago, March 25—Upon invitation of the Rahe Auto & Tractor School in Chicago, the Automotive Equipment Assn. has arranged to give its merchandising talk and show the "Ask 'Em to Buy" film once a month at the school. The plan is to have all students taking the short term course hear the lecture and see the film before completing the course. The first lecture was given the evening of March 22 by W. S. Martel, salesmanager of E. D. Kimball & Co., of Chicago. It was heard by 150 students.

RECEIVER FOR LA FRANCE TRUCK

Elmira, N. Y., March 25—Oscar N. Reynolds and Alexander S. Diven have been named receivers for the Ward LaFrance Truck Co. of this city by the Federal Court. The action will keep intact the assets of the company, it is said, until bills can be paid. The company claims assets of $280,000 and liabilities of $180,000. The business is being continued and the receivers say that prospects for paying off all indebtedness are favorable.

DAILY PRICE REDUCTION SALE

Galesburg, Ill., March 25—Wright Motor Co. last week offered an unique sale of 15 used cars. Opening day of the sale the price tag was attached with announcement that the price would be reduced $20 and in some instances $25 daily during 10 days of the sale. In newspaper columns each day lists of current offerings were run.

NASH MARCH SHIPMENTS

Kenosha, Wis., March 27—The Nash Motors Co.'s orders for March shipment are 67 per cent in excess of shipping orders the same month a year ago. Factory records show that in March last year 2081 Nash cars were ordered out by dealers and distributors throughout the country while this year orders for March shipment total 3486 cars.

Chrysler Predicts Strong Buying by Farmers Soon

Higher Prices for Corn, Hogs and Other Products, Restores Purchasing Power

By WALTER CHRYSLER,
Chairman of the Board, Maxwell Motor Corp.

DETROIT, March 28—Farm buying will have an important part in the progress of the automobile industry in June, July, August and September. There has been considerable buying recently by the farmers, due to an increase in prices for some of their products, notably corn and hogs, and this business will grow as the demand for other of their products brings better prices.

Buying by the farmers after September will lessen, but it will greatly exceed their buying in the winter months of this year and last when it was practically stopped.

Payment of a soldier bonus should not depress business inordinately if handled by the Government on a sound basis. There should be no increase in taxes required. Those soldiers who were injured or are in need should be taken care of at once at all costs. Those who are not in need should be compensated as the business conditions of the country permit.

The more money there is for industry the more work there will be for everyone, and consequently, more prosperity. Business has made steady gains in spite of resistance owing to the withdrawal of money from circulation by the Government to pay off debts incurred during the war. Prosperity is largely a matter of keeping money in circulation.

SUCCESSOR TO E. C. FRADY ELECTED

Chicago, March 27—The Cole Motor Co., retailer of the Cole cars, has changed its name to Cole Motor Co. of Illinois. Eugene W. Silver, for nine years general manager, has been elected president to succeed E. C. Frady, and John R. Thompson, Jr., son of the chain restaurant proprietor, has become financially interested in the company, being elected vice president.

OGREN PRICES REDUCED

Milwaukee, March 25—The Ogren Motor Car Co. has announced price reductions on all its models. The old and new prices are:

Model	Old	New
7 passenger standard touring	$4350	$3850
4 passenger standard roadster	4250	3750
5 passenger sport touring	4250	3750
4 passenger sport roadster	4250	3750
7 passenger sport touring	4350	3850
4 passenger coupe	5200	4500
7 passenger sedan	5500	4800

Ford Adopts Five-Day Week

Survey to Find Cost of Wholesale and Retail Sales

University Gathering Data From Members of Denver Automobile Dealers' Assn.

DENVER, March 27—A survey of the cost of doing business in the wholesale and retail automobile and truck fields has been undertaken by the Denver Automobile Dealers' Assn. The survey is being conducted separately for the distributor organizations of Denver and the dealer organizations of the Rocky Mountain territory. The work is being directed by the extension division of the University of Colorado.

The university is sending to Denver distributors and Rocky Mountain dealers questionnaires covering several pages, on which they are requested to give detailed information regarding total investment, total sales for 1921, sales of user cars, parts and sundries, repair labor, etc.

Another division of the questionnaire requests information as to the relationship in percentage of the total sales to the cost of salesmen salaries, advertising, sales management, commisions, salaries, instruction and sales expense, traveling, administration and guarantee expense, new car expense, etc.

Reductions of $300 to $400 On Jordan Cars Announced

Cleveland, March 28—Price reductions on the different Jordan models announced by the Jordan Motor Car Co. range from $300 to $400. This reduction brings prices back to the pre-war level. The new prices are:

Model	New Price	Old Price
Five-passenger	$1795	$2095
Playboy Roadster	1895	2095
Five-passenger Sedan	2785	3200
Brougham	2785	3200
Laundalet	2695	2995

The price of the seven-passenger Jordan models have not been reduced. Jordan production will approximate 800 this month and the schedule for April is 1,000.

GENERAL MOTORS CHANGES

Wilmington, Del., March 28—Pierre S. duPont, president of the General Motors Corp., announces the following changes in the company's personnel, which became effective last Saturday.

Owing to the appointment of K. W. Himmerschied as assistant to the president of General Motors Corp., it has been necessary to relieve him of his duties in the Chevrolet Motor Co., of which he remains president.

William S. Knudson has been elected vice-president of the Chevrolet Motor Co., in charge of operations. K. T. Keller remains as a vice-president of the company, as manager of manufacturing. Colon Campbell remains a vice-president of the several Chevrolet sales companies and general manager of the Chevrolet Motor Co.

Many Applications From Dealers to Handle Star

New York, March 27—Several hundred applications from dealers in every section of the country to handle the new Star car have been received at the headquarters here of Durant Motors, Inc. Detailed plans for the distribution of the Star have not been worked out, however, and no appointments will be made until that has been done.

Chevrolet Puts on Night Shift at Flint Plant

Detroit, March 28—Chevrolet Motor Co. has started a night shift at the Flint plant for the first time in several months. Nine hundred axles a day are now being made for shipment to the various assembly plants. It is planned to build 800 engines a day by April 1. All engines and axles for Chevrolet cars are now being made at Flint.

RECEIVER FOR TEMPLAR REFUSED

Columbus, O., March 27—On the grounds that the plaintiff, Nathan T. Clyburn, had not make a sufficient showing to the court to warrant such action, Judge Warner in Common Pleas court refused to appoint a receiver for the Templar Motor Car Co., of Cleveland.

NEW TRUCK COMPANY

Kenosha, Wis., March 28—William Martinson, formerly first vice president of the Winther Motor Truck Co. and Charles T. Abbott who formerly was secretary of the same company, have formed a new corporation to be known as Martinson Motors, Inc., to manufacture motor trucks. The capital is $2,225,000.

TWIN CITY TRACTOR REDUCED

Minneapolis, March 27—Minneapolis Steel & Machinery Co. announces a reduction in the price of its Model 12-20 Twin City tractor from $1,395 to $1,200.

GARDNER PRODUCTION INCREASING

St. Louis, March 27—The Gardner Motor Co.'s production for this month will exceed 1,000 cars, and the schedule for April calls for 1,500.

TORBENSEN EXTENDS SERVICE

Cleveland, March 25—Announcement is made by the Torbensen Axle Co. that it is establishing a chain of parts service stations throughout the country.

Permanent Policy to Give All Employes Two Days Off

Plan Results in Hiring of 3,000 More Men—Daily Wages Not Changed

DETROIT, March 28—Ford Motor Co. has adopted the five-day week as its permanent work week, all plants of the company to be closed all day Saturday and Sunday in the future. The principal reason for the change, as given by Edsel Ford, president, is to provide work for more men and to give employees two full days in which to enjoy other pursuits.

"Every man needs more than one day a week for rest and recreation," Edsel Ford said. "The Ford company always has sought to promote ideal home life for employees. We believe that to live properly every man should have more time to spend with his family, more time for self improvement, more time for gardening, more time for building up the place called home.

"Right now market demands warrant the operation of the Ford plant six days weekly, but we are satisfied that the five-day week is practical and it has been adopted as the permanent policy of the company. In equipment and man-power the plants will have to be placed on a basis where they can take care of production in five days weekly. It will mean work for 3000 more men."

Ford said there would be no change in the wage schedules applying to any employes connected with the company at the time of the five-day week adoption. They will continue to receive $6 a day minimum. Men just being employed, however, are being started at $5 a day, the original Ford minimum which was increased to $6 during the war period of high costs.

Three Gangs of Automobile Thieves Broken Up by Police

Chicago, March 27—Automobile thefts in Chicago have dropped from an average of 15 or 20 a day to three a day since the breaking up of three gangs of automobile thieves by the police, it is announced by the police department.

The chief of police made known that within the last 10 days the police department has arrested leaders of three gangs of thieves and also many alleged members of these gangs. It is said that these thieves disposed of stolen cars through a garage in Chicago conducted by a man who was arrested. Six stolen cars were found in this garage. The total value of cars stolen by the three gangs last year is estimated by the police to be $500,000. Other arrests are expected.

Automobile Salesman Risks Life to Aid Party of Tourists

Paddles Across River Astride Plank In Storm to Get Aid When Ferry Sinks

SPOKANE, Wash., March 27—After a tour of three months in snow drifts and rose gardens, H. G. Thompson, automobile salesman, has returned to Riegel Bros., Dodge Bros. car distributors. Thompson brought with him a tale of the resourcefulness of Archie A. West, former salesman for the same firm, that saved them and the occupants of 30 other cars from a near famine and hardship.

This occurred at the John Day ferry in northern Oregon, where the motorists happened to meet, some of them after five days of detouring and with little to eat. "We found the ferry boat half submerged on the opposite shore and the cable down on our side," says Thompson. "To turn back would have been futile in the face of the storm and we could not remain there.

"West solved the problem. He pulled down a sign board that advertised the Wasco hotel, several miles distant and on the opposite side of the river, and pushed it into the water. Astraddle of the plank and with a board for a paddle, he braved the tumbling water and reached the opposite shore. The current carried him far down the river and to a point a short distance above the rapids, where he would have met his Waterloo.

"On the opposite shore he found a telephone and apprised Judge McKee, mayor of Wasco, of the plight of the party, perhaps 65 in all, including some women. Mayor McKee proved to be a thoroughbred and a hospitable gentleman of the old school. He told West that he would send food for the party and a gang of men to repair the ferry.

"But the men of the party were not of the kind that would wait for help. Although lacking tools, they raised the cable, over which part of them traveled to the opposite shore. They calked the boat and bailed it out and at 3 p. m. took the first car across. McDonald, owner of the ferry, which had been suspended for the season, refused to accept pay for the use of his boat. The beefsteaks, sandwiches and coffee, provided by Mayor McKee and the Wasco folk and prepared by the women of the party, had a deliciousness of flavor that we had never enjoyed in the best restaurants."

Dunlop Plant at Buffalo to Be Operated, President Says

Buffalo, March 28—Frederick Wolcott, president of the Dunlop Tire & Rubber Co. of America, in an official statement made public here, declared there is absolutely no foundation for rumors that the firm's $25,000,000 tire plant here is to be sold to Henry Ford or to any one else.

"The plant will be operated solely as a Dunlop institution," Wolcott said. This is the first official information regarding the numerous rumors that have recently been in circulation here and elsewhere regarding the plant.

Wolcott said he hoped to have a "favorable announcement" within the next three of four months. He declined to indicate when commercial production would be begun at the plant, saying this would depend on a number of circumstances.

Manufacturer Uses Cream Separator to Reclaim Oil

KENOSHA, Wis., March 25—The cream separator is being used by the Nash Motors Co. to reclaim oil used in its engine testing department, resulting in the saving of thousands of dollars a year, according to officials of the company.

Oil for reclamation is placed in a large reservoir. From this it is piped into two 150-gallon tanks which stand on a platform just above a special centrifugal cream separator. In the overhead tanks the oil is heated by steam to the proper temperature after which it is allowed to settle for eight hours. It is then run through the separator, the centrifugal action of which removes virtually all remaining foreign matter, including water. The result is a reclaimed oil of high quality.

Premier Reorganization is Progressing; Gets New Money

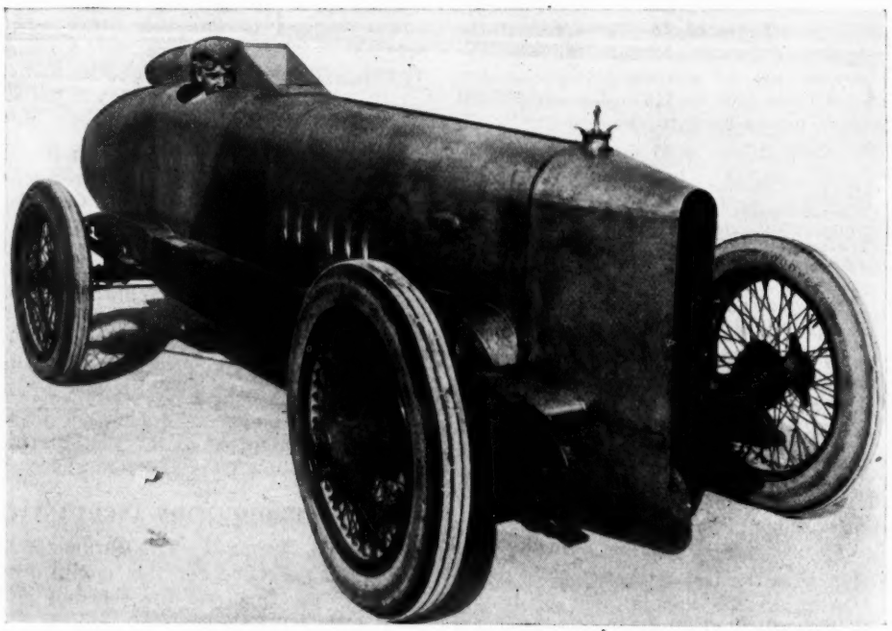
$500,000 Additional Capital Said to Be in Sight—to Keep Production Schedule

INDIANAPOLIS, Ind., March 28—Plans for the reorganization of the Premier Motor Corp. have been practically completed, but a detailed statement is withheld pending final decision regarding the management and additional directors. The plan has been accepted by 90 per cent of all creditors, including 75 per cent of the merchandising creditors.

The refinancing, it is understood, will bring in about $500,000 in new money. It is reported that the plan has the backing of the Fletcher-American National Bank, the administrator of the estate of the late L. S. Skelton.

The reorganization plan is conditioned upon the transfer of all assets of the Premier Motor Corp. of Delaware to the Premier Motor Corp. which would be organized under the laws of Indiana with a capital of $1,000,000 divided equally into preferred and common shares. The new capital which would be brought in would be sufficient to complete the present production schedule, thereby liquidating enough of the inventory to provide for the ultimate payment of merchandise obligations.

Racer Designed for Record Trial



NEW racing car of Sig Haugdahl, dirt track racer, with which he recently traveled a mile in 22 2-5 seconds over the Pablo Beach course at Jacksonville, Fla. The timing was not official. The body of this car is only 20-in. wide at its widest point. The motor was originally intended for a government hydroplane and weighs only 600 pounds. It develops 250 hp. Haughdahl is training at Daytona Beach and expects to make an official speed test in the next two weeks.

General Motors' New Plan to Finance Dealers and Buyers

Acceptance Corp. Arranges Payments of Farmers on Tractor Sales to Suit Income

DETROIT, March 25—General Motors Acceptance Corp. has worked out a series of plans for the financing of sales of Samson tractors and farm implements to farmers whereby the payments are arranged according to the incomes of the buyer on his products. Examples of the way the plans operate are as follows:

Plan one is recommended for sales to dairy farmers or those having a regular monthly income. This provides for a down payment of 30 per cent in cash and equal monthly payments over a period of 12 months or less according to the ability to pay.

Plan two is recommended for sales to farmers raising cotton or other yearly crop. This provides a down payment of 40 per cent in cash and the balance in one payment in 12 months or less.

Plan three is recommended for sales to farmers raising an annual crop and live stock. This provides for two payments, the first in six months or less, the second in 12 months or less, with a one third cash down payment.

Plan four provides for two deferred payments of eight and 18 months with a down payment of 40 per cent. This permits the final payment to be spread over two crops and allows the use of the tractor and implements in preparing the soil for each crop.

Plans have also been worked out for the disposal of used cars or trucks taken in by dealers in the rural districts in part payment for tractors and implements. One of these provides for a 40 per cent down payment with equal monthly payments for 12 months or less. The other is for 50 per cent down with one deferred payment in seven months or less.

On the monthly payment plans rebates of one half of one per cent a month will be made where the entire indebtedness is met before due. A rebate of one per cent a month is allowed for each month of anticipation under plan two. Under plans three and four the rebate is one per cent a month on each payment prepaid for each full month of anticipation.

The wholesale plan is a method of financing factory shipments of new Samson tractors, trucks and power implements to be stored either in a warehouse or on the dealers showroom floor. Under this plan Samson products may be shipped by freight direct to the dealer, or by the manufacturer to a sub-dealer for the account of the direct dealer.

Only enough products are financed to enable the dealer to have a representative stock and to enable prompt delivery to customers. No stock will be financed which the dealer cannot sell at retail before the maturity of the note. All papers in connection with the transaction are handled through the local bank of the dealer.

The dealer must pay 15 per cent of the invoice price of the products. The differential charged by the company is three quarters of one per cent on the 85 per cent financed. Products remain the property of the finance corporation until fully paid for.

Proportional Reduction in Rent for Employes Laid off

Marysville, Mich., March 25—With the resumption of normal operations at the Wills Sainte Claire factory, all the employes of the company who were laid off last fall have returned to work. At the same time, it has become publicly known that employes living in homes furnished by the company have had their rent reduced during the period of depression in direct proportion to their loss in wages. The man who was kept at work half time had his rent reduced 50 per cent and the man who was laid off entirely had no rent to pay.

Employes who were buying homes from the company were given similar relief, their interest and principal payments being deferred.

CLEVELAND CLUB ELECTION

Cleveland, March 25—Members of the Cleveland Automobile Club at their annual meeting elected officers and directors. Walter D. Meals was chosen president for the fourth consecutive term. and Fred H. Caley was re-elected secretary. Caley has been secretary for so long that no one, including himself, knows just what term his new one is.

Meals, John R. Bentley and Henry L. Schuler were returned to the board of directors. The remaining six directors are Nathan I. Dryfoos, G. G. G. Peckham, Dr. John H. Quayle, Robert J. Schmuak, Arthur H. Seibia, and John L. Young. Seibig was re-elected treasurer and Peckhas vice president.

NEW WACHUSETT TRUCK

Fitchburg, Mass., March 27—The Wachusett 2½-ton truck, assembled from standard units for the New England market, is a newcomer in the commercial field. The parts used include such names as Continental, Timken and Brown-Lipe. Officers of the Wachusett Motors, Inc., the assembler, are F. S. Suthergreen, president; W. C. Dresser, vice-president; F. H. Brown, treasurer and R. H. Bingham, secretary.

MORE FARMERS OWN CARS

Fort Wayne, Ind., March 27—Forty-four per cent of the property holders in Allen county possess automobiles, according to L. W. Oser, county assessor. Reports show that 65 per cent of the farmers in the county own automobiles while but 27 per cent of the city residents own machines.

Texas State Fair to Erect Automobile Show Building

Permanent Home for Dallas Dealers' Displays Will Cost $130,000

DALLAS, Tex., March 27—Dallas automobile dealers and manufacturers doing business through agents at Dallas, are to have a permanent home for annual shows or displays. This was decided this week when the State Fair of Texas announced it would erect at an expense of $130,000 a building at the fair grounds especially for automobile displays and displays of manufacturers. The building will be 500 feet wide and 185 feet deep. It will probably be two stories high, arranged for additional stories. It will provide at once something like 100,000 square feet of space on the ground floor for display purposes.

Work to Begin at Once

Work on the new building will begin at once. It will be completed in time for the state fair this fall. The state fair directors will put up $30,000 of the money and the automobile dealers the remainder. The main show of the year, the fall display, is always held during the fair and at the fair grounds. It lasts for sixteen days. More than a million persons visit the fair annually and the automobile dealers have found that the shows there produces business all the year, as the visitors come from all sections of the state.

As the building develops, it is possible that accessories and tires will be allotted spaces on the second floor and that spaces for amusements will be provided. It is planned to eventually make the new automobile show house one of the finest, most convenient and most interesting in the country.

The Dallas dealers are elated over the arrangements and are already planning for the big fall show, which will start in October.

PRICES OF E-B TRACTORS

Rockford, Ill., March 25—The prices of Emerson-Brantingham tractors which have been in effect since last fall are: Model AA, $1095; model Q, $750; model D (16-32), $1750. Owing to delay in the correction of tables in MOTOR AGE, the old prices were given in specification tables after the new prices had become effective.

DORT SALES GAINING

Detroit, March, 25—Dort production in 1922 is showing steady gains as the season progresses, according to an analysis of sales by President J. Dallas Dort. January tripled the output of the same month in 1921 and February more than doubles January. Orders for March delivery will exceed February by more than 200 per cent.

Two Cleveland Plants Show Sharp Increase in Business

Body Factory on Full Production for Three Buyers—Parts Makers Busy

CLEVELAND, March 27—Two of Cleveland's largest industries, both of which are allied with the automobile business, are riding along on business waves that are breaking more smoothly than they have for the past two years.

The Fisher Ohio Body Co., has found that the $6,000,000 new plant, in which it commenced production last September, is not large enough to accomodate its business, and it has taken a lease on the plant of the Briggs Manufacturing Co., which is adjacent to the main plant of the Fisher Company. This building will give an additional 175,000 square feet of space, which will be used to house the finishing business. E. F. Fisher, president of the Claveland plant, says that the entire production is now going to the Chandler, Cleveland and Chevrolet companies.

Running at Capacity

The plant is now running at capacity production and is turning out from 250 to 275 bodies daily.

The annual statement of the Standard Parts Co., Cleveland's $20,000,000 parts and accessories manufacturing concern, which has been in the hands of a receiver for nearly two years, shows that the company's net business in 1921 was $7,233,033. That figure is one-third below the volume for the previous year.

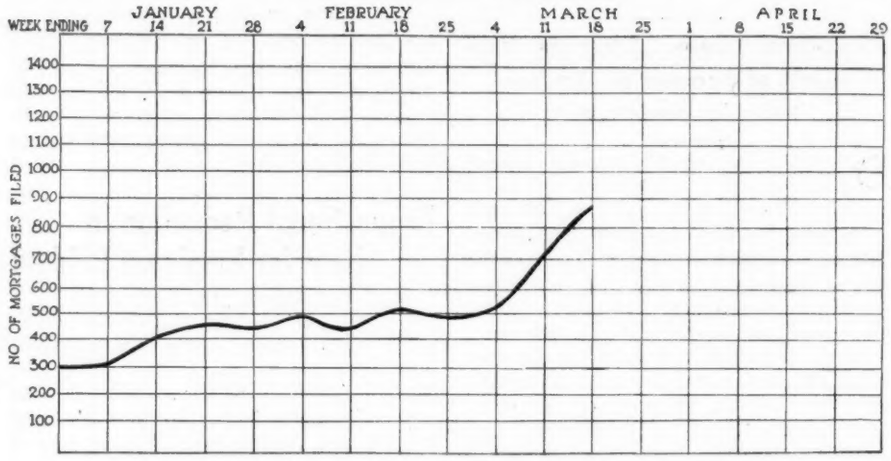
On this business the company produced a profit of $316,280 before a heavy depreciation and inventory adjustment were made. In this period the company found it advisable to enter a depreciation of $398,341 and inventory adjustments of $204,348, so that a net loss of $286,400 was experienced.

Cash Position Bettered

Notwithstanding the difficulties that were encountered, Receiver Frank Scott bettered the cash position of the company. This account went up from $428,661, on December 31, 1921, to $613,881, on March 1, of the present year. The sum of $4,931,920 was disbursed to Dec. 31, 1921, and of this amount there were two dividends to creditors that aggregated $1,943,018.

In line with a general policy of retrenchment and the unification of the manufacturing end of the business, the plant of the Canton Forge Co. was sold for $293,500. Remaining equipment and inventory not available for the American Axle plant was sold for $59,000. After adjustments the company's assets total $15,134,467, exclusive of patents and good will. The company on Jan. 1, of the present year, had orders booked for $5,324,762 and the spring business has been more than the usual seasonal spurt.

How Chattel Mortgage Record Shows Increase of Chicago Retail Sales



Steady Increase in Retail Automobile Sales in Chicago

Chicago, March 28—Figures compiled by the Central Auto Finance Assn., of Chicago, show the steady increase in the sale at retail of automobiles in Chicago and Cook county since Jan. 1. The figures are based on time sales as indicated by the number of chattel mortgages on automobiles filed with the county recorder. C. L. Wolf, secretary of the association, estimates from long study of the automobile financing business that the time sales, including truck sales, represent about 75 per cent of total sales.

The number of chattel mortgages filed by weeks ending on given dates follows: Jan. 7, 302; Jan. 14, 410; Jan. 21, 458; Jan. 28, 442; Feb. 4, 493; Feb. 11, 442; Feb. 18, 517; Feb. 25, 486; March 4, 524; March 11, 719; March 18, 873.

Wolf said that in the last few weeks the records indicate a substantial increase in the sale of trucks.

HIGH LICENSE FEES BLOCKED

Springfield, Mass., March 27—At a meeting of the Automotive Dealers' Assn. that the bill to increase fees on cars and trucks in this state had been blocked as a result of vigorous opposition, and that a milder measure would be offered for passage. The show committee reported that the recent event had proved the most profitable of any show here as regards receipts and sales, one concern having sold 14 cars in show week.

WILLS COMPANY FINANCED

Detroit, March 24—Arrangements have been made with Boston bankers by C. H. Wills and Co., makers of the Wills Ste. Claire car, under which they will be provided with a revolving credit of $6,900,000, which will run until July, 1923. This it is said, will provide a working capital adequate to meet all needs and will relieve the company of financial worries for more than a year, at least.

Five Sprint Races to Be Run at Los Angeles April 2

Los Angeles, Cal., March 25—Five sprint races will be run on the Beverly Speedway here April 2. The first four will be elimination contests of 25 miles and the final will be 50 miles for the winners of the first and second places. Prices will be awarded for each race. Among the entries are Murphy, DePalma, Bordino, Sarles, Hartz, Kline, Elliot and DePaolo.

Ralph DePalma has shipped his famous Ballot back to France and in these races will pilot a Duesenberg. Under the patronage of Cliff Durant he is building a new racing creation here for this year's eastern campaign, including Indianapolis. Jimmie Murphy has decided to abandon his French Grand Prix Duesenberg and also is building a new car here.

MT. CLEMENS DEALERS ORGANIZE

Detroit, March 25—Mt. Clemens automobile dealers at a dinner this week voted to form a dealers' association to be affiliated with the Michigan Automotive Trade Assn. Louis Priehs was elected temporary chairman and head of the organization committee, the other members of which are O. R. Dickerson and W. J. Mayer. The committee will determine whether the association will include only Mt. Clemens' dealers or all dealers in Macomb county.

Speakers at the dinner were C. F. Applegate, former secretary, and A. C. Johnson, vice president of the Flint Automobile Dealers' Assn.; W. D. Edenburn, manager of the Michigan Automotive Trade Assn.; P. J. Ullrich and H. J. McGill, the two latter being Mt. Clemens' bankers.

SPARK PLUG CO. SOLD

Boston, March 25—The Liberty Spark Plug Corp. has purchased the assets of the Federal Corp., of Westfield, Mass., and also the patent rights and trade mark, to manufacture and sell Liberty spark plugs.

Business of Parts Makers Reflects Gain in Industry

Some Plants Approaching 50 Per Cent Capacity—All Show Increases

DETROIT, Mich. March 25—Parts makers in the Detroit district have been greatly encouraged by the volume of business which has come to them since the turn of the year. A considerable number of plants are approaching an output of 50 per cent capacity. While the major part of the business has come and continues to come from a comparatively few companies, releases and new orders for supplies are coming in smaller volume from most of the companies in the industry. This would indicate that all manufacturers are sharing in the increased sales of motor cars. Truck builders also are buying on a scale which demonstrates a better market for commercial vehicles.

At a recent meeting of credit men representing some 25 companies in the Detroit and Cleveland districts, reports of better business were almost unanimous. In most cases February sales were at least double those of January and in a few instances much more than that. March business in many instances will double that of February and April will be better than March. Two or three reported that March will be the best month they ever had.

Collections on current business are excellent.

The chief element of doubt in the minds of the parts makers is what is going to happen after April for they have few specifications beyond May 1.

FUEL ECONOMIZER TRIED OUT

Lima, O., March 27—The Gramm-Bernstein Motor Truck Co. has made a test of a new device known as the Gramm fuel economizer which is to be used on trucks manufactured by the company. In the test a one-gallon tank was hung on the side of a loaded truck and attached by a gasoline line with the carburetor. The tank was filled and the car run without the economizer until the gasoline was exhausted. The run was seven miles. The tank was again filled and the economizer attached. The run then was 7.45 miles, an increase of 6.4 per cent in mileage. The economizer is placed between the carbureter and the manifold and uses the exhaust gases to preheat the gasoline vapor.

DIVIDEND PAYMENTS RESUMED

Akron, March 27—The Akron Standard Mould Co., manufacturers of rubber making and tire building machinery, one of the many Akron companies which were forced to suspend dividend payments during the automotive industry slump, announces that it will resume dividend payments. Directors of the company have declared a one per cent dividend payable April 1 to stock of record March 15. It is understood the company expects to maintain the one per cent dividend payable monthly in the future, having paid all of its bank indebtedness.

Bay State Cars Factory Branch Opened in Chicago

Chicago, March, 25—The R. H. Long Co. of Worcester and Framington, Mass., producer of the Bay State automobiles, has opened a factory branch in Chicago, for the distribution of cars to dealers in Chicago, in Illinois and throughout the West. L. E. Commings, connected with the Long company for 22 years, is general manager and his assistant is J. A. Howlett, who was with the Dodge distributors in Chicago for two years.

The company expects to obtain 12 dealers in Chicago and already has contracts with two. These are the Brennan & Doty Co. and the Warner Motor Sales Co.

The factory branch will sell at wholesale only and expects to carry a stock of 120 cars at all times. The models and retail prices of the cars are: Phaeton, $1800; roadster, $1800; coupe, $2400; sedan, $2500. The car is assembled and is equipped with six cylinder Continental engine, and other standard units. The bodies are of aluminum. The R. H. Long Co. has for years been engaged in the manufacture of automobile bodies.

HARTFORD DEALERS ELECT

Hartford, Conn., March 25.—Ralph D. Britton, proprietor of the R. D. Britton Co., was elected president of the Hartford Automobile Dealers Assn. David B. Roberts, proprietor of the Hartford Buick Co., was elected vice president. Dwight A. Burnham of the Acme Motor Sales Co., Marmon and Lexington distributor, was elected treasurer to succeed himself and Arthur Fifoot was re-elected secretary. The association has made good progress in the past year. The recent show was a big success, it was announced.

CITY SALES PREDOMINATE

Burlington, Ia., March 25—Burlington dealers report marked improvement in sales during the first part of the month. W. B. Hunt, a dealer, says that distinct change in relative demand for cars is noticeable and that 75 per cent of the business of the season will be done in the cities, whereas in other years the farmer furnished three-quarters of the trade.

WILCOX TO RACE AT INDIANAPOLIS

Indianapolis, March 25—Howard Wilcox, winner of the 1919 Indianapolis 500-mile race, has filed his entry for the tenth annual international sweepstakes five century, next May 30. Wilcox will drive the Peugeot he tooled a year ago.

Franklin 4-Cylinder Car to Be Made in Syracuse

Announcement of Factory Location Says Production of 100 a Day Will Be Goal

SYRACUSE, N. Y., March 25—H. H. Franklin, president of the Franklin Automobile Company, has announced that the plant in which the new Franklin Four will be manufactured will be located in Syracuse. Efforts had been made to persuade the Franklin company to purchase available factories in 15 other cities.

Franklin announced that eventually the company will produce 100 four-cylinder cars a day to sell in the $1000 class. Running at full time, the proposed plant will employ about 5000 men.

The new machine will be placed on the market April 1 next year.

B. & O. TRIES MOTOR CAR

Wilmington, Del., March 25—The Baltimore & Ohio Railroad Co. is experimenting with gasoline motor driven cars with a view to operating them, if tests warrant, on short hauls, chiefly in commuter service. The tests are being made on the Philadelphia division between Wilmington and Philadelphia, a 28-mile run. A White-Brill car is the one that has been tried out, so called because it combines the White motor and the Brill car, being manufactured at the Brill car works, in Philadelphia. In the tests so far made about 35 mile an hour has resulted, the car making nine or ten miles on a gallon of gasoline. It carries 25 gallons.

BOWSER INCREASES WORK HOURS

Fort Wayne, Ind., March 25—Scheduled hours for employes in the shop of S. F. Bowser & Co., Inc., of this city, pump and tank manufacturers, are now 50 a week, due to increased business. The day men will work nine hours a day for the first five days of the week and five hours on Saturday. The night men will work ten hours a night for five nights a week, starting at 7:30 o'clock. Overtime will not start until the scheduled hours for the day or night have been worked. This is the longest work schedule in force at the Bowser plant for some time.

469,318 CARS IN CANADA

Montreal, Que., March 27—The following statistics regarding the number of automobiles in the Dominion have been compiled by Arthur Legendre, collector of the provincial revenue.

	1920	1921
Ontario	176,600	206,900
Saskatchewan	59,708	62,958
Quebec	44,900	59,707
Manitoba	36,322	40,439
Alberta	38,500	38,750
British Columbia	28,000	31,000
Nova Scotia	12,450	14,250
New Brunswick	11,101	13,564
Prince Edward Island	1,418	1,750
	408,999	469,318

Three Mistakes Made by Many Automobile Dealers

Inefficient Service the Greatest of These, Says Former Packard Employee

AUSTIN, Tex., March 28—"The automobile distributor must look at his business in the light of confidential relationship with his customer, as the doctor or lawyer with his clients; if he abuses the confidence, he will lose future business."

This was the expressed opinion of Edward Karl McGinnis, formerly connected with the sales department of the Packard Motor Car Co., of Kansas City, and now professor of business administration in the University of Texas. McGinnis believes that there are three chief faults in the sales policies of automobile distributors.

"The greatest mistake, I believe," he said, "is in the service situation. Many companies abused the confidence of the public in their service department. Most men do not know anything about the mechanical details of a car. They take it to the dealer and rely upon his judgment as to what it needs. Many concerns put in parts when the old ones are not worn out and charge big repair bills."

"Another mistake is in the trade-in policy. At the time when it was hard to get cars, used cars were very much in demand, and the price was very close to new cars. Distributors made too large allowances on used cars, in order to sell the new cars, since factory prices on new automobiles could not be cut. For instance, they would take in an old car for $500 more than it was worth, so that they could sell their own car. Then they tried to pass the old car on to other purchasers for what they paid for them. So they made enemies out of people who would otherwise have been in the market for new cars.

"A third mistake is in the sale of cars on credit. They are sold on a basis of 15 to 20 per cent interest on deferred payments. But the interest charge is so mixed with the cost of insurance, and is a flat rate on the whole price of the car, that customers are deceived in many cases in the amount they thought they were paying."

McGinnis was employed chiefly in the truck department of the Packard distributing house in Kansas City. He was concerned with the transportation engineering side. He analyzed jobs and decided what type of truck was needed. He then endeavored to sell the prospect on this conception.

"The viewpoint of modern automobile distributors is not that they are selling pieces of machinery, but are selling ten years of work," said McGinnis. "Their first effort is to analyze the job and see that the right one of different kinds of machines is put on that job. Then they follow that machine every month during its ten years of life to see that it is being properly handled and is standing up.

"One customer, I remember, wanted pneumatic tires on a three and a half ton dump truck. I told him that wasn't the truck for the job. I didn't sell him our truck. A rival salesman sold him what he thought he wanted. Inside of three months time he had suffered an $800 loss. He then bought the truck we recommended. The truck with the pneumatic tires cost him $500 more, but the other salesman wanted only to make that one sale, and so lost his future business."

Salesmen Must Be "On Their Toes"

PHILADELPHIA, March 27—In the new sales and showroom of the Hurley Motor Co., distributor of Reo cars, there are no desks for the salesmen, although there are plenty for them in special rooms. But while they are in the showroom, there will be no absorption in perusing cards in the index files, or papers, and every man must be alert for the incoming customer.

Chevrolet Working Out Flat-Rate Maintenance Plan

Detroit, March 25—Chevrolet Motor Co. is working out through its Detroit retail branch a flat rate system of service which is expected to be ready for general adoption by all Chevrolet dealers early in the summer. Chevrolet branches are now installing latest features of the new Chevrolet models, such as the hand emergency brake lever, for owners of former models at a fixed cost.

TURNS TO RADIO PRODUCTS

Detroit, March 25—Commerce Radiophone Co. has been formed as a subsidiary of the Commerce Motor Car Co., by Walter E. Parker, president, and other officers of the company. Production and deliveries have been started.

The development of the radiophone as an auxiliary to automotive manufacture is regarded as a natural movement and one which is likely to be taken up by other companies as a means of utilizing some of the present unoccupied factory space. General Motors anticipates that some of the factory buildings it is offering for sale will be taken over by radiophone companies.

AUTOCAR HOURS INCREASED

Ardmore, Pa., March 25—The Autocar Co.'s main factory here has increased its working time three hours, to 50 hours a week. This brings additional returns to 1250 employes. One thousand other employes in branches also are working on the same basis. David Ludlum, president of the company, says that business so far this year has increased 25 per cent.

Standard Wiring Plan for Automobiles is Advocated

W. S. Haggott Tells S. A. E. Meeting of Steps Taken for Uniformity

BUFFALO, March 27—Standardization of electric wiring for automobiles was advocated by W. S. Haggott of the Packard Electric Co., of Detroit, at a meeting here of the Society of Automotive Engineers.

"In conformity," said Haggott, "to the general tendency to standardize motor parts, it is proposed to consider plans for a standardization of the electrical wiring of different automobiles, particularly wire and cable construction and methods of installation. Two years have already been spent in designing suitable cable.

"The wiring of an automobile is different from the wiring in a house or a factory. Tendency is strongly toward the use of braided covered high-tension cable, the braid, being filled with a good baking varnish. It is preferable to run high-tension wire open. There is a tendency to use armored cable on lighting circuits. This would be a good insurance against lighting circuit troubles.

"The use of a main line circuit breaker is strongly advised. Standard color schemes for various circuits should be used by all manufacturers of automobile wires. Proper grounding of the battery is essential, and it is surprising how many maintenance stations neglect the proper grounding of the batteries."

TO FORM NEW ASSOCIATION

Portland, Ore., March 25.—Steps towards the formation of a Multnomah county automobile association, to embrace the various associations within the industry now operating in Portland, were taken last week, with the appointment of committees by the Automobile Dealers' Assn., of Portland and the Portland Automotive Trades Assn. to meet together and consider the possibility of a merger.

It has been the desire of many of the automobile men of this section to perfect a state-wide association, such as are now operating in Washington and California with great success. The time does not now seem ripe for a state association in Oregon of the scope of the Washington and California bodies, however, and the Multnomah County Assn. is proposed in its place. If the Multnomah association is formed it will no doubt be a stepping stone to the state-wide organization at some later date.

CORRECTION

In the March 9th issue of MOTOR AGE the caption for a cut on page 16 stated that running boards are not fitted to the Chandler phaeton. We are informed that running boards, or steps, are optional on this model.

BUSINESS NOTES

Dempsey Cycle Co., Philadelphia, recently gave a dinner to all of its stockholders. W. L. Dempsey, president of the company was the principal speaker.

United Auto Stores, Philadelphia, have had an extension of time granted them by Judge Thompson of the United States court in the disposal of their assets.

Rippey & Kingsland, attorneys for Wedler-Shufford Co., St. Louis, have brought suit against New England Mills Co., Chicago, and Hodes-Zink Co., charging unfair competition.

Universal Body Co., Mishawaka, Ind., through H. J. Lambert, chief engineer, announces an increase in production of from 30 to 50 per cent. A goal of 25 bodies a day has been set and it is expected that this will be reached before another month. The Universal Co. makes bodies for Fords.

Folberth Auto Specialty Co., Cleveland, announce a 30 per cent reduction in price on their automatic windshield cleaner, making the retail price now $7.

General Spark Plug Co., St. Louis, has been incorporated under the laws of Missouri for $120,000, fully paid up, and expects to be in production in 30 days. T. W. Meloan is president of the company; B. C. Howard, vice president; W. H. Grant, secretary and treasurer. These officers compose the directorate together with E. J. Newton of Cleveland, and Wells G. Murphy of Kendallville, Ind. J. M. McKernan is production manager.

Goodyear Tire Co. dealers of Iowa held a meeting recently at Burlington. Ia., where advertising and sales promotion work was discussed.

Williams, White & Co. will soon start production of an automatic grinder from plans prepared by W. C. Osterholm, who has joined the company as consulting engineer.

Reo Motor Sales Co., Quincy, Ill., has increased its distributors' area until it is one of the largest in western Illinois. The company handles Reo cars and trucks exclusively in six counties along both sides of the Missisippi river.

Wayne Oil Tank and Pump Co. has announced that it will now run two shifts of nine hours each in most departments and nine and a half hours in some departments.

Shuler Axle Co., Inc., of Louisville, Ky., has acquired the entire assets of the Shuler Axle Mfg. Co. and is already in operation for the production of front axles for motor trucks, trailers, tractors, motor busses, etc.

Chain Battery System, Inc., which has been located in Lake Charles, La., will move to Houston, Tex. The plant will manufacture motor car batteries.

Dittmar Implement and Auto Co., Mossback, Ill., has purchased the George T. Smith plant in Clinton, Iowa, and plans extensive improvements in the plant and service. R. L. Keyser will be manager with A. N. Aker in charge of the maintenance department.

Second Tour of A. E. A. "Ask 'Em to Buy" Film in Oregon

Portland, Ore., March 28—The A. E. A. "Ask 'Em To Buy" film, which was shown in several cities in Oregon in February and attracted great attention among the automobile equipment men, has started its second tour of the state, visiting cities which were not included in the first itinerary. In February the film was shown in Portland and in Willamette valley towns, and on the present tour it will be shown in the following cities: Astoria, Tillamook, Marshfield, Hood River, Bend, The Dalles, Pendleton, Walla Walla (Washington), La Grande, and Baker. It is estimated that over 1300 dealers and their employes witnessed the film at the first showing, and an even larger number is expected to see it on the present tour, which ends on March 31.

The following Portland automotive equipment jobbing firms are sponsoring the showing of the film in Oregon and are financing the tour: Ballou and Wright, Chanslor and Lyon, P. J. Cronin Co., The George Lawrence Co., Marshall-Wells, Waterhouse and Lester, and Wiggins Co., Inc.

TABLES TIRE BILL

Louisville, March 25—The bill of E. A. Gullion to require tire manufacturers to stamp the date of manufacture of tires sold in Kentucky, was tabled in the House of Representatives. F. J. Humbert, representative of Louisville, led a fight on Guillion's bill, asserting that it would work an unjustified hardship on tire manufacturers and dealers. Gullion insisted that tires defective because of age are being sold.

REGULAR USED CAR AUCTIONS

Hartford, Conn., March 25—That an automobile auction is a big drawing card was evident from the results of an auction conducted by Constable E. J. Lacy this week for a private dealer in used cars. Twenty-two cars went under the hammer and in some instances it would appear that very good prices prevailed. A Cadillac coupe of former years sold for $875, a Buick for $525, an Oakland for $200 and a Ford touring car for $115. It was said that several local dealers passed a few cars into the auction in an endeavor to move them. New York, Boston, Poughkeepsie, Springfield, Worcester, New Haven and Bridgeport buyers attended. Constable Lacey announced the auctions would be held every week. It is the intention to have the auction serve as a clearing house for private owners, which means that the dealers in new cars will not have to handle trades.

USED CAR SHOW AT EL PASO

El Paso, Tex., March 27—A show of used cars will be held here by local automobile dealers for three days beginning March 30. Only cars which the dealers are willing to back up with the reputations of their firms will be shown. The show will be opened with an auction sale by the government of automobiles seized in whisky raids. Each day thereafter the dealers will set aside a certain number of cars to be sold at auction. Any person living outside El Paso but in the El Paso trade territory who purchases a used car for $500 or more will have his fare refunded, according to an arrangement announced by W. G. Brooks, manager of the show.

How Fort Wayne Used Car Mart Operates; 52 Sales

Twenty-three Dealers Co-operate, Keeping More Than 60 Cars on Display

FORT WAYNE, IND., March 27—In the first three weeks that the used automobile mart has been conducted by A. L. Randall in the Barnes building in the heart of the city, 52 used cars, ranging in price from $200 to $1,500 have been sold.

This is considered evidence by the local dealers who are cooperating in the mart—and these include all members of the Fort Wayne Auto Trade Association—that the plan is an excellent way of disposing of used cars and it will therefore be continued all during the summer.

The mart is operated as a private enterprise by Randall. Twenty-three dealers are exhibitors at the mart. Not less than sixty cars have always been on display.

Each dealer who exhibits cars makes a contract with Randall to pay $5 a month storage for all cars on display and ten per cent commission on all cars sold from the floor. A dealer may, if he wishes to remove a car, do so by the payment of three per cent commission on the fixed price.

Randall employs salesmen on a commission basis who spend all their time at the mart explaining and demonstrating cars. As they are employed by Randall they are absolutely impartial and push no particular cars. Their object is to sell the cars the buyers want as, otherwise, they can make no money out of it.

The agreement between Randall and the dealers also provides that each car placed in the mart must remain there for sixty days, under the three per cent proviso explained above. At the end of this time the dealer may remove the car if he wishes to do so or enter into another sixty day agreement.

VOTE ON WILLYS-OVERLAND PLAN

New York, March 25—Preferred stock holders of the Willys-Overland Co. who hold the veto power have been asked to approve a plan under which the bank creditors of the company agree to accept $16,500,000 in seven per cent bonds, maturing Dec. 1, 1923, to retire the present unsecured bank loan. These bonds would be secured by fixed assets of the company in such a way that the current assets would be available as working capital.

The preferred stock of the Willys-Overland company stipulates that no encumbrance can be placed upon the fixed assets without the consent of holders of 75 per cent of the preferred stock. It is understood that the Stephens interests which own considerably more than one-third of the preferred are agreeable to this plan which has been accepted by the reorganized board of directors.

IN THE RETAIL FIELD

Holcomb Auto Supply Co., Hartford, Conn., has taken on the Lee puncture proof tire for Hartford county.

Anderson Motor Sales Co., Richmond, Va., has contracted for the distribution of the Coachbilt Six in the Richmond territory. L. H. Baker, president, will have active charge of the company's affairs.

John F. Toman Sons Co., the oldest and largest dealers in accessories in Trenton, and agents for the Dearborn truck, have contracted for Anderson distribution in Trenton and several counties in central New Jersey.

H. G. Kirkland, widely known in motor car distributing circles in Kansas City, is establishing the Haynes Automobile Co. of Kansas City, for retail selling of Haynes cars.

Missouri Valley Auto Co. has secured the distributing contract for Maxwell and Chalmers in Kansas City territory, and is temporarily occupying the quarters heretofore used by the Hutchings-Snyder Co.

Linden Garage, Hartford, Conn., has taken on the White truck in Hartford county.

Williamson-Lexington Co., distributors for the Minute Man Six and the Superior Chevrolet in several counties of southwestern West Virginia, recently opened a new salesroom together with a complete maintenance department.

Stutz Chicago Co. has been organized to handle the Stutz cars in Chicago. A. S. Johnson is general manager.

Boston Tire & Rubber Co., of Asheville, S. C., has opened a branch office in Hendersonville, N. C. The business is under the management of J. H. Reaben.

W. S. Smith, Havanna, Ill., agent for the Studebaker car, will occupy handsome new sales and maintenance rooms April 1.

Lapham Cadillac Co., Sioux City, is being succeeded by the J. H. Hansen Cadillac Co., who will be distributors of Cadillac cars in the Sioux City district as well as in Omaha and Lincoln, where they have handled the Cadillac line most successfully for the last five years.

Case Rubber Co., Hartford, Conn., has taken on the Hewitt tires in the local territory.

Main Street Used Car Exchange is the latest automobile addition to Houston, Tex. The company will make a specialty of used cars and will conduct a maintenance and painting department in connection.

The Standard Automotive Co., of Texas, has taken over the agency for the Chandler in Houston. Its territory consists of 40 counties. In addition to Chandler cars, parts and service will be offered for the Chandler.

Bering Auto Equipment Co., Houston, celebrated its thirteenth anniversary this week. The company is one of the largest tire and accessory dealers in Texas.

Schofield Auto Co. has relinquished its Ford agency in favor of the Chevrolet. It will have the exclusive territory for Utah, Juab and Wasatch counties.

Bert F. Anger, for six years a Ford dealer in Milwaukee, has disposed of his interests in the Anger Engineering Co., to accept the Chevrolet franchise as retail dealer.

Hamper-Johnson Co., Milwaukee, distributor of the Earl, has been appointed distributor also for the Wills Sainte Claire in the same territory, namely, Wisconsin and upper Michigan.

Walter A. Jaeger, Milwaukee, has organized the Davis Car Sales Co. to take the distribution of the Daxis six in Milwaukee and southeastern Wisconsin.

S. & S. Auto Co., Manitowoc, Wis., has been incorporated with $20,000 capital by Harold, Monroe and Edgar Schultz, to deal in motor vehicles and conduct a garage and maintenance station.

Chippewa Valley Auto Co., Chippewa Falls, Wis., Fred A. Bigler, general manager, plans the erection of a $50,000 addition to its present sales and service building, representing an investment of an equal amount.

Arthur F. Searles, Brodhead, Wis., has opened an exclusively automotive electric service and battery sales and maintenance station.

Weingart-Lambeck Co., Milwaukee, Hupmobile dealers, has moved to its new garage and maintenance department.

Jones & Ward Co., Mauston, Wis., has been formed by C. A. Jones and T. H. Ward to engage in the sale and maintenance of motor vehicles, farm lighting systems, gas engines and electrical appliances.

Gibson Auto Exchange & Tire Co., Appleton, Wis., plans the erection of a garage, display room, store and service station, 40x100 ft., two stories, at a cost of $25,000. G. J. Schwab is local manager.

Lloyd E. Mitchell, Tomahawk, Wis., garage owner and repair man, has filed a voluntary petition in bankruptcy. Assets are $180 and liabilities $4730.

F. J. Domke, Sparta, Wis., dealer in motor cars, tractors and farm implements, has purchased a lot and will build a sales and maintenance addition.

Jacobsen Auto Co., Racine, Wis., has plans for a one-story brick and steel storage and maintenance addition to its garage.

Allen & Zander, dealers and garagemen at Merrill, Wis., have incorporated the partnership as the Allen & Zander Co., with $25,000 capital stock. The ownership remains vested in Harry R. Allen, Albert Zander and John O'Day.

Bachman Electric Co., Fond du Lace, Wis., has purchased the entire business of the M. C. Smith Electric Repair & Supply Co., acquiring also the services of M. C. Smith as manager of a new department for automotive electrical maintenance.

Waukegan Auto Sales Co., Waukegan, Wis., has been appointed Buick dealer, taking over the franchise of the Waukesha Auto Co.

Prison City Motor Co., Waupun, Wis., is a new Maxwell and Chalmers dealer.

Julius H. Johnson, Iola, Wis., dealer and garageman, has filed a voluntary petition in bankruptcy, scheduling liabilities at $5350 and assets at $825.

George Stuart and W. L. Schmidt, Sheboygan, Wis., have formed a partnership as the Stuart & Smith Garage and engaged in the automotive sales and maintenance business.

Pine Auto Co., Sheboygan Falls, Wis., has been incorporated for $10,000 by Robert H. Thieman, Ford dealer at Sheboygan, Wis.; Arthur A. Erdman and Willard C. Erdman, both of Sheboygan Falls, to conduct a sales and maintenance business.

Cohen & Haymond, Springfield, Mass., have reorganized in the name of the International Motor Car Co., with A. L. Cohen at the head and now occupy a large sales room.

James V. Bray of the Pomeroy-Bray Motor Sales Co., Chicago, Ford dealers, says that sales look good for this month and that their maintenance division is already doing capacity.

First Winton Sale 24 Years Ago Celebrated by Company

Cleveland, March 24—Nation-wide interest attaches to the celebration here today by the Winton Co. of the first sale of a Winton automobile 24 years ago. This car was sold March 24, 1898, to Robert Allison of Port Carbon, Pa., a mechanical engineer. This was an important event in the beginning of the automobile industry for during the remainder of that year 20 more Wintons were sold, the purchasers being engineers, coal mine operators, capitalists, merchants and manufacturers. The first Winton sold is now owned by the company and recently was run through the streets of Cleveland.

TWIN-SIX TO BE CONTINUED

Detroit, March, 25—Alvan Macauley, president of Packard Motor Car Co. has issued a statement to distributors and dealers pointing out that there are more than 30,000 owners of Packard twin-six cars in the United States and that the company, despite persistent rumors, has no intention of abandoning the twin-six manufacture.

Increased Employment Helps Cleveland Automobile Sales

Workers Back on Job Are in Market for Used Cars, Aiding Sale of New

CLEVELAND, March 27—Cleveland automobile dealers have experienced during March a quickened demand from two sources. One is the presence in the new car market of more buyers, and the other is the return to the used car market of many workers who are back on the job after an enforced layoff.

The two demands have come in the opportune time.

Fully 90 per cent of the persons in the new car market this month want to trade in their used cars. The dealers have been bothered to some extent during the winter months, by their inability to take in used cars. But now the sudden spurt of the demand for used cars has been stimulating to both kinds of business.

Surveys that have been made all show that there are more jobs in the city and that many thousands more men are now employed than there were eight months ago.

In the days of the war, a great many employed in the factories acquired automobile habits as a result of high wages paid, and when they were laid off they disposed of their cars for what they could get for them. This hurt the used car market for the regular retailer.

Now, however, that the men are back on their jobs they find they do not care to go along without an automobile. The average retailer here is of the opinion that the peak of employment for the spring has not been reached, and that as a result business in April and May will be better than in any of the months of 1922 that have passed.

The Barnes Motor Co., the Dodge distributor, says that March has been the banner month of the year. It has had to advertise for used Dodge's to supply the demand for the used car salesroom.

The Ohio Buick Co., has experienced an unexpected demand for the new four cylinder in Cleveland, and it has experienced difficulty in filling orders. This company looks forward to increased business during the succeeding three months, and is relying on an expected expansion of production and business in other lines to deliver larger business to it.

Similar reports were received at offices of the Studebaker Co., The Simmons Motor Co., Chandler distributor; The Avenue Motor Co., Chalmers and Maxwell.

200 SALES AT FORT WORTH SHOW

Fort Worth Tex., March 25—The third annual show of Fort Worth automobile dealers was visited by about 150,000 persons and more than 200 cars were sold during the week.

CONCERNING MEN YOU KNOW

C. M. Zimmerman has resumed his activities as manager of the wholesale division of the Larson-Oldsmobile Co., distributor of Oldsmobile in the Philadelphia territory.

George P. Parker has joined the forces of the Hurley Motor Co., Philadelphia, as special representative.

Arthur O. Nelson, formerly secretary of the Fargo (N. D.), Business Men's Assn., has assumed office as executive secretary of the Chicago Garage Owners' Assn.

W. C. Allen, former manager of the Black & Decker Philadelphia branch, has been made branch manager of the Black & Decker Chicago territory.

Harry P. Branstetter, distributor of the Kissel automobiles in Chicago, has incorporated his firm under the name of Harry P. Branstetter, Inc., with a capital stock of $100,000 and 2000 shares of no par value. The incorporators are Branstetter, Robert D. Jones and H. Mather.

I. B. Derbyshire will succeed Harry Barrett as assistant treasurer of the Detroit Pressed Steel Co. in the near future. Barrett has tendered his resignation to enter the radiophone manufacturing field with a company which he is now organizing.

Charles S. Turner, formerly of the Robinson Cole Co., New York, has joined Hupp Motor Car Co as far eastern representative and is now preparing for a trip through his territory, which will take about 18 months' time. While with Robinson Cole, Turner handled the Cole export interests in this field and is familiar with the business possibilities.

Clarence A. Pffefer, former head of the Saxon Motor Car Co., has formed a consulting engineering company under the corporate name of C. A. Pffefer and associates, which will specialize in financial problems within the industry.

George T. Bergen, of Philadelphia, the engineer who will have charge of the construction of the International Harvester Company plant Fort Wayne, Ind., has arrived in the city and begun his work.

W. E. McCrea, 63, for 20 years general manager of the Moline Wagon Works and vice-president and sales manager of the plant after it was taken over by the Deere & Co., died March 16 in South Pasadena, Cal.

A. G. Fell has sold his interests in the Kewanee, Ill. Buick Co. to his partner, J. O. Huffman, a veteran Kewanee automobile man. The Fell-Huffman firm was formed a few months ago.

Harry M. Rose and **Harry C. Peto** have organized the Greater Tires Co. and opened office at Davenport, Iowa. They will deal in wholesale and retail tires.

H. D. Hyder, of the firm of Hyder & Stepp, Hendersonville, N. C., has purchased the Ramsey Motor Co. business of that city and changed the name to "Depot Garage."

Richard C. Sleeth of the sales department of the Nash La Fayette Co., Hartford, Conn., has been made sales manager of the Nash department.

Aaron G. Cohen, Hartford, Conn., having been forced to vacate the premises which are to be used by the city for a municipal garage has erected a two story sales, maintenance building.

A. L. Oliger, secretary of the Kansas Automobile Trades Assn., who has been instrumental in building up this organization to a high stage of efficiency, has resigned to become secretary of the Long Beach, Calif., chamber of commerce.

K. J. Leach has joined the Elgin Motor Car Corp. as district representative covering the states of Texas and New Mexico, with headquarters in Dallas.

Robert H. Campbell, formerly president of the Campbell Engineering Co., Chicago, has been made vice-president and chief engineer of the Wharton Motors Co., of Pittsburgh, Pa. Other officers of the company are: President, Thomas P. Wharton; second vice-president, E. W. Fluke; secretary and treasurer, L. D. Heckman. This company has a tractor plant at Dallas, Tex., and will erect a factory at Johnstown, Pa., to make passenger cars and trucks.

W. J. Clemens, branch manager of the Olds Motor Works in Detroit, announce the appointment of "Chan" Johnson as sales manager of the Oldsmobile branch.

LeRoy Casper has become manager of the Syracuse branch of Strong Motors, Inc. and Buelte Motors, Inc. of Rochester, Chandler and Cleveland distributors in Central Western New York and Northern Pennsylvania. Casper is located in a handsome, new salesroom.

George E. Adams, who has been conducting a Ford agency under the name of the Adams Motor Co. at Williamansett, Mass., for several years, has become a member of the H. K. Smith Co., Ford dealers, Springfield, Mass.

Frank H. Chapman, formerly of the Corson Automobile Co., and for twenty years head of the Rogers Carriage Co., Springfield, Mass., died at his home in that city March 10.

Charles H. Barritt, formerly foreman for the Berkshire Welding Co., has opened an official maintenance station for Overland and Willys-Knight cars in Pittsfield, Mass.

William G. Brown, for the past eight years western sales manager of the American Bosch Magneto Co. at Chicago, has resigned to become associated with the A. H. Peterson Mfg. Co., Milwaukee, as general sales manager.

Todd O. Kellogg, since 1914 connected with the Overland Wisconsin Co., Milwaukee, recently as supervisor of branch distributing stations, has resigned to become associated with Henry C. Quarles & Co., Milwaukee, a bond and investment securities house.

N. B. Reisinger, for six years associated with the distribution of the Briscoe, and more recently with its successor, the Earl, in the Wisconsin and Upper Michigan territory, has resigned as sales manager of the Hamper-Johnson Co., Milwaukee, distributor of the Earl.

Rudolph Hokanson, vice-president of the Nash Sales Co., Milwaukee, a large territorial distributor of the Nash, has been appointed chairman of the transportation committee of the Milwaukee Association of Commerce by the new administration. Arthur Davidson, sales manager of the Harley-Davidson Motor Co., has been appointed chairman of the foreign trade committee, the work of which is expected to be from this time forward one of the principal activities of the Association from the standpoint of manufacturers and distributors of Milwaukee.

AKRON FAVORS ACCEPTANCES

Akron, March 25—The trade acceptance system employed by Akron tire manufacturers in negotiating with banks for their credit, has vindicated itself and will be continued and expanded, despite the outside criticism aimed at the system, according to William O'Neil, vice president and general manager of the General Tire & Rubber Co., and president of the Ohio State Savings & Trust Co., of Akron.

"The plan adopted by Akron bankers and manufacturers of extending credit on orders booked for manufactured merchandise—in other words the trade acceptance plan—has been widely criticized and condemned both in and outside of Akron and by both manufacturers and bankers, "says O'Neil. "But the trade acceptance system has been so effectively employed here for years that it is largely responsible for what and where Akron is today as one of the manufacturing centers of the world."

STEVENS-DURYEA ASKS FOR TIME

Springfield, Mass., March 24—Stevens-Duryea has mailed letters to its creditors asking for an extension of six months to meet its obligations. The annual meeting which was set originally for March 13 but postponed, has again been postponed until March 27.

Bloomington Dealers Tighten Up On Used Car Sales Policy

Meet Once a Week to Get Reports of Sales and Discuss Policies

BLOOMINGTON, ILL., March 25—The Bloomington Automobile Dealers Association, since the adoption of the new system of handling used cars, voted to meet every Monday noon for an hour's session, instead of the biweekly evening meetings as in former years. It was also agreed that every dealer who accepts a used car in a trade for a new, must make a report in writing to the chairman of the used car committee, giving the amount allowed for the used car, together with the name and date of manufacture.

Since the new method was adopted a month ago, some reports of violations were alleged, but when investigated by the committee, were found to be false. The dealers agreed that the reduction in the allowance for second hand cars would have a tendency to slow up business for a time. Owners of such cars who found that they were unable to obtain the extravagant allowance for such cars formerly in vogue, might be inclined to wait a month or two before making up their mind to trade. Eventually, it is believed here, the deals will be made, and, at a basis of profit, assuring the regular commission on new cars and also the probability of a profit on the used cars will show a profit averaging twenty per cent and all the men in the business here are working to that end.

ACCESSORY MEN MEET

Philadelphia, March 25.—One hundred and forty members and guests of the Automobile Accessories Business Association attended the March meeting and dinner of the organization in the quarters of the Philadelphia Trade Association. The speaker of the evening was Charles E. Grakelow, who announced that he had purchased 100 tickets for the donation party to be given by the accessory men in the interests of their proposed new building, on the night of May 12, at Lulu Temple. Fourteen new members were admitted to the association.

VAN SICKLEN WITH APPERSON

Chicago, March 24—N. H. Van Sicklen who was president of the Chicago Automobile Trades Assn. in 1911, 1912 and 1913, has been appointed assistant general manager of Apperson Bros. Automobile Co., of Kokomo, Ind., it is announced by Edgar L. Apperson, president of the company.

Van Sicklen was a pioneer in the automotive industry and formerly was publisher of MOTOR AGE. Later he was manufacturer of the Van Sicklen Speedometer. The Apperson company manufactures the Apperson cars.

The Readers' Clearing House

Questions & Answers on Dealers' Problems

Advice on Entering Maintenance Business

Q—The writer is a mechanic employed in a shop and has been laying plans for entering the repair business. Please advise what you think of specializing on motors and ignition with a completely equipped shop in a town of 200,000. With business conditions in their present state do you think it advisable to enter this business now or wait until things shape themselves better?—Subscriber, Cleveland, O.

In the above inquiry you ask questions that are quite difficult to answer. The difficulty is chiefly in the fact that we do not know the local conditions in the town you refer to.

Your question as we understand it is: should you establish an automotive maintenance station specializing on motors and ignition in a town of 200,000 population now, or should you wait until business conditions appear to be more favorable.

You, also, mention the fact that you expect to open a completely equipped shop.

Your questions involve so many of such unlikely practices that it is hard to answer them within a degree of finality of the conditions under which you expect to operate this station. In the first place the phrase "completely equipped" is subject to many interpretations. To open what we would regard as a "completely equipped" shop is a considerable adventure.

It means that you must be able to do thorough testing and that you must have the instruments in which to prove that your work is accurately and well done. Such equipment for a town of 200,000 would mean a considerable investment. It is our belief that the obtaining of this equipment today would be a decidedly good financial adventure. We believe that much of this equipment is being sold at a lower price than it will be sold later.

Before making a decision as to the opening of this shop we should think that you would convince yourself thoroughly, by a canvass of the community you mention, as to what facilities it affords that you expect to undertake.

What will be the competition that you expect to meet? We would suggest that you canvass the motor car dealers and other general shops in the neighborhood very carefully to see what degree of support that they would give to you and learn, if possible, where they are sending the work that they are not equipped to do.

This canvass, to our minds, is one of the most important features in deciding the questions you have in mind.

As to whether you open this shop now or sometime later, we should think it would be a local question to a certain extent. One question that is involved is the facilities for such a shop. Are the rents, in this community that you expect to open your shop, still inflated, or have they been brought down to a business basis?

Rent conditions are different in different cities. In some places the landlords have adjusted their rents to a reasonable basis and in other places the property owners still believe that there is a possibility of very high rents. The serious part of the rent situation is that it is extremely difficult to get the price of rent adjusted lower after you have once rented the place of doing business.

Generally speaking we would regard the present time as an excellent one for opening such an establishment. Motor vehicle owners are showing an inclination to be quite economical with their equipment, but where they can be shown that repairs are actually cheaper than new equipment they are spending money quite freely with the good repair shops.

One thing that would be absolutely necessary under present conditions is that you should organize a progressive and intelligent sales department to put your idea over with the shop and vehicle owners in the community where you open your establishment.

We cannot hope to advise you directly on this question but we hope that the points made on this page will bring to your mind some of the factors that should be considered by you before you start operations.

Perhaps you would be interested in the articles appearing in MOTOR AGE of December 18 and 25, 1919, and January 1, 1920, on the completely equipped electrical maintenance stations.

The Reader's Clearing House

THIS department is conducted to assist dealers and maintenance station executives in the solution of their problems.

In addressing this department, readers are requested to give the firm name and address. Also state whether a permanent file of MOTOR AGE is kept, for many times inquiries of an identical nature have been made and these are answered by reference to previous issues.

Inquiries not of general interest will be answered by personal letter only. Emergency questions will be replied to by letter or telegram.

Address of business firms will not be published in this department but will be supplied by letter.

Technical questions answered by B. M. Ikert and P. L. Dumas; Legal, by Wellington Gustin; Paint, by G. King Franklin; Architectural, by Tom Wilder; General Business questions, by MOTOR AGE organization in conference.

The Tire Dealer and the Tax

Q—Can a tire manufacturer, jobber or distributor legally pass on to the dealer the excise tax? As I understand the law the manufacturer collects the tax from the distributor and that should end it.—H. L. Rice, Hereford, Texas.

It is an old saying that there are many ways to skin a cat. Perhaps that is what this proposition amounts to. There is another old saying that the public always and ultimately pays. Now, of course, one who is legally taxed as such cannot make another bear that burden except by shifting or passing it on. The manufacturer or distributor may be the one to pay to the government, but that does not mean that the same party may not add the same tax to the selling price of his product and make the purchaser pay him back; and the dealer, say, may pass it on to the public who ultimately pays. This is true with most all taxes—it is figured in the cost price.

Yes, the tax may be passed on in the manner indicated—and the only recourse the purchaser has is not to buy, which could be made very effective where necessary to redress wrongs.

FORD ENGINE WILL OPERATE ON NATURAL GAS

Q—It is possible to use a Ford motor as a stationary engine and use natural gas as fuel?

2—If so can you put us in touch with someone selling a gas carbureter?—Wm. White, Collinsville, Ogla.

1—It is quite possible to use a Ford motor as a stationary engine for quite a number of engine manufacturers use this type of fuel in block testing their engines, and find it satisfactory.

2—This information will be given by letter.

Architectural Service

IN giving architectural advice, MOTOR AGE aims to assist its readers in their problems of planning, building and equipping, service stations, garages, dealers' establishments, shops, filling stations, and, in fact, any building necessary to automotive activity.

When making request for assistance, please see that we have all the data necessary to an intelligent handling of the job. Among other things, we need such information as follows:

Rough pencil sketch showing size and shape of plot and its relation to streets and alleys.

What departments are to be operated and how large it is expected they will be.

Number of cars on the sales floor.

Number of cars it is expected to garage.

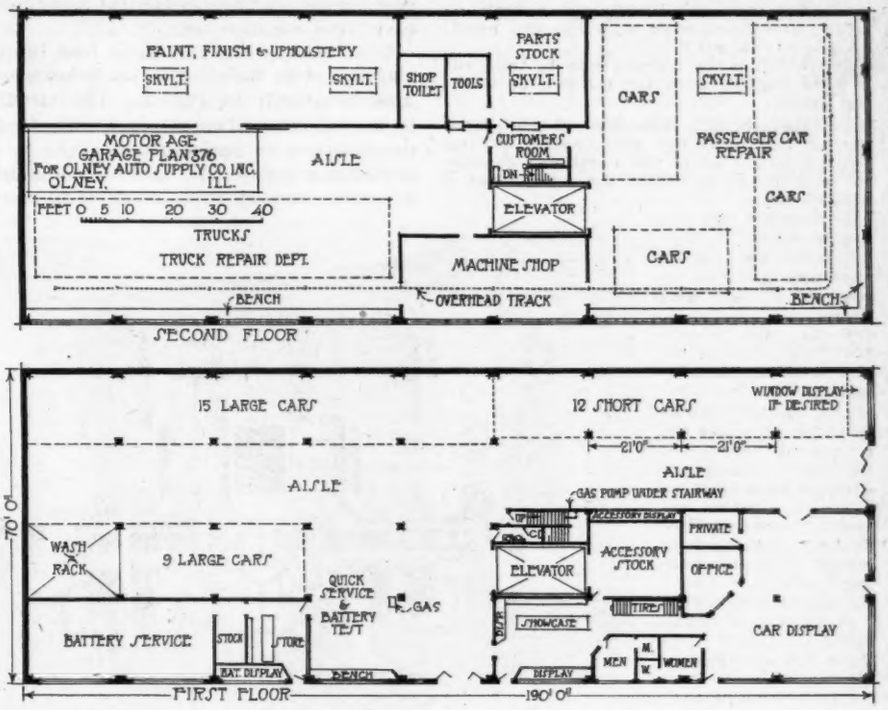
Number of men employed in repair shop.

And how much of an accessory department is anticipated.

Regulating Zenith Carbureter

Q—A Chevrolet 490, 1916 model, was running good, had plenty of power and speed but we decided to clean the carbureter. We took it apart and found the low speed idling well full of mud; it had about a thimble full, which was cleaned out. The carbureter was put back on and now it uses too much gas and we cannot regulate it. It acts like an over-size jet. Give sizes of jets to use.—Verne Van Stienburg, Stockport, Iowa.

It is possible that this trouble was not due directly to the idling well but the fact that there is considerable play in the butterfly shaft which by cutting the amount of air regularly taken through the idling well would compensate for it and give just the right mixture. The following experience with Zenith carbureters has been submitted by A. A. Frederick, Martinsville, Ill. His communication reads as follows: "I have handled Chevrolet cars and given Chevrolet service and have dealt almost exclusively with Zenith carbureters. A Zenith carbureter that has functioned properly on a car can be made to do so again with very little work, and no new parts. After seeing that the carbureter is clean and there is no obstruction in the gasoline line, and the carbureter still fails to function properly, then examine the butterfly shaft for air leaks about it. A small leak here will admit air instead of it entering the carbureter through the proper channels. This produces the effect of poor idling, and irregular running at slow speeds. To remedy this I bore out the hole enough to true it up and fit in a new shaft. To do this I use a 7/32 or 15/64 drill using stock of some kind that will work down to this with the least work and at the same time make a perfect fit. The stock that I generally use is 20 penny spike nail working this down with a slight taper and pressing it into place, leaving it slightly tight. Since the jets do not change I have always found the trouble as stated above and have been successful in making the repairs in every instance." We believe that Frederick's experience with these carbureters is valuable and it is certainly worth trying in your case. The recommended jet equipment for the carbureter used on the Chevrolet 490 for 1916 is as follows: Choke No. 19, main jet No. 85, compensator No. 90, idling well No. 40. If after trying Frederick's suggestion and after checking up on your present equipment of jets and choke in the carbureter that you are using you do not correct the trouble, we would suggest that you communicate with the nearest Zenith service station.



Sales and Maintenance Building with Departments for Complete Service

PLAN 376

Q—We are planning to build a garage on a corner lot 70x190 ft. and would like to have your help in designing the floor space and locating the different departments. We handle cars and trucks. We want enough showroom space to accommodate about four cars. We will handle accessories, oil, gasoline, tires, parts for at least two and possibly three makes of cars. We will have a welding department, battery department doing charging and rebuilding as well as selling new batteries. We will want a well-equipped repair shop with about six or seven men employed as mechanics. We also will have an elevator and washrack large enough for two cars to be washed at one time. Would like you to work out a storage plan so we could store the maximum number of cars on lower floor without having to move cars in order to get another car out. We also want an office and small private office, one women's restroom and women's and men's toilet on ground floor. Will you please give us the proper location for these different departments?—Olney Auto Supply Co., Olney, Ill.

A building of 70 ft. width is difficult to handle with economy of space. The garage to be most efficient should be 50 ft. wide or slightly over and after this strip is taken off the 20-ft. strip left is not good for much except small shops.

When a front entrance is desired it is better to take enough space for a row of cars as well, since the storage space gained here is more accessible and consequently more valuable than any other. The arrangement also gives a straight aisle which, if the aisle were next to the wall, would have a jog, entailing more waste space.

A slight increase in storage space would be made if the front entrance were abandoned and the garage entered from the side street only. However, by the time space is taken for a connecting aisle between the three necessary cross aisles we are nearly back to where we started, possibly three or four cars to the good, but with no front entrance.

If the gas pump is inside, place it under the landing of the stairway, so that cars stopping for gas would be in front of the illuminated accessory display. It might also be near the side entrance but might interfere with service activities here. If outside, it should be in front of either the battery or accessory store. On the upper floor a good general rule is to place the machine shop between the truck department and the passenger car department so that it can serve each equally well.

The parts stock, tool and toilet rooms are likewise centrally located and customers have a special room where they get parts without going into the shop. The whole second floor is post free, the roof being supported by trusses.

The 20-ft. strip at the rear on the side street makes an ideal location for battery service station and salesroom. Battery service can be given outside on the street; in bad weather the service entrance can be used.

TUBULAR CONNECTING ROD EXPENSIVE TO PRODUCE

Q—What are the advantages and disadvantages of the tubular connecting rod?

2—Are aluminum rods practical? When used, are the caps lined with babbitt or is the aluminum used as a bearing metal on the crank pin?

3—Which is the correct way to take out a Ford engine, with the oil pan or without it?

4—Explain the principle of the two-spring valve. Is the outer spring strong enough alone or is the combined tension of both made to equal the tension of a single spring?

5—Explain the dry pump oiling system as used on racing cars and give an illustration or diagram.

6—Is the stroke bore ratio limited for any mechanical reason or is it influenced by the height of the engine and the ground clearance? On some racing engines it is as high as 2 to 1. With extremly small cylinders of 1.5 to 2.5 bore would a stroke bore ratio of 2.5 or 3 to 1 be excessive?

7—How are valve seats enlarged? Is it done by a standard reamer or is it done by larger valve seat reamers in succeeding sizes?

8—How are phosphor bronze or cast iron seats fastened in an aluminum firing head? Is this combination better than a cast iron cylinder head?

9—Explain the different methods of fastening removable cylinder sleeves in an aluminum cylinder block. Which method is the most satisfactory? What kind of gaskets are used and how many? Give illustrations of some representative designs.—E. Johnson, Kansas City, Mo.

1—The disadvantages of the tubular connecting rod are in its great cost to manufacture as compared with the average I-beam rod. It introduces many advantages in that it offers the strongest connecting rod for its weight. It can be machined all over and the section will be more nearly uniform than in any other construction and therefore a somewhat higher stress can be allowed.

2—Aluminum connecting rods have not been used in numbers and over a long enough period of time to determine their practicability.

They are provided sometimes with a bushing of anti-friction metal, but in most cases the alloy itself is used as the bearing metal and the aluminum bears directly on the crankpin. Considerable experimental work is in process on these rods at the present time.

3-4—Perhaps the best way to remove a Ford engine is to remove the entire power plant including the oil pan. This should be done by disconnecting the dash at the two supporting brackets which rest on the frame and detach the steering post guide bracket carried at the left hand side of the frame. This makes it possible to remove the steering post and all the wiring as one assembly. Before taking off the steering post from the dash assembly it is necessary to disconnect the carbureter control and timer cover and advance rods.

5—A view of the full force feed lubrication system installed on an L-head engine is shown in Fig. 1. The circuit is as follows: The oil is drawn from the reservoir in pump of motor (A) by a circluating pump (B), and forced under pressure, through tubes or ducts to cam-

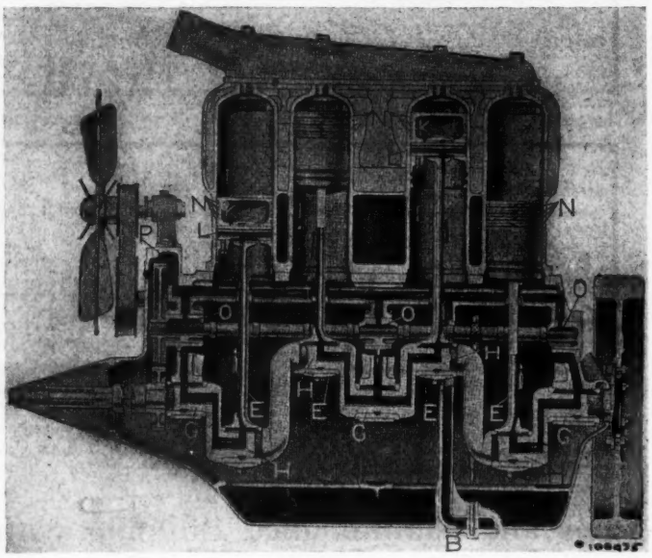
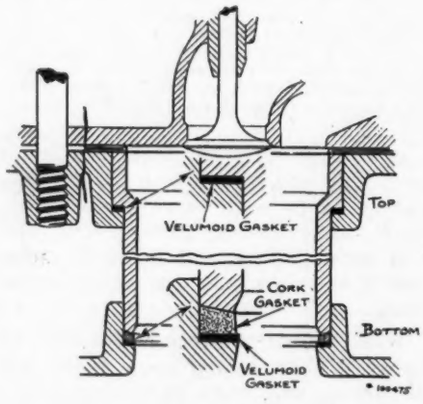


Fig. 1—Cut of typical pressure oiling system. The solid black lines indicate the oil passages. The oil circulating pump is at "B"

shaft bearings (0) and to main bearings (G) which it lubricates. Oil is also delivered in a stream which pours over timing gears (P). From the main bearings the oil is forced under pressure, through ducts bored in the crankshaft to crank pin bearings (H).

Oil feeds under pressure, from crank pin bearings through ducts or tubes attached to connecting rods to wrist pins (L). Oil escaping through the hollow wrist pins lubricates the cylinders. The oil under pressure, escapes from each side of the crank pin bearings and is splashed onto the walls of the cylinders (I) and lubricates the cylinders, pistons (K) and piston rings (N). The push rods (T) are lubricated by the oil which splashes on them. Some engines employing this system, have provision for additional oil feed, under pressure, to each cylinder, the feeds being controlled by the speed of the engine. After having passed through the various bearings the oil is returned to the sump through a strainer, where it enters the circulating pump and travels again as described. In this system the connecting rods do not dip into the oil.



Cross-section of Top and Bottom of Premier Cylinder Sleeve Packing

Fig. 2

In some racing cars where an overhead camshaft is used the rocker arms are also lubricated as is also the rocker arm shaft. This is done by tapping the main feed line with an oil pipe which leads to the hollow camshaft, distributing oil under pressure to the rocker arms through holes in the rocker arms and rocker shaft which register at certain points.

6—The bore and stroke ratio have an effect on the volumetric and thermal efficiency of an engine. The long stroke engine permits a higher piston speed with a lower number of revolutions per minute of the crankshaft than the short stroke engine. The height of the engine and the width of the engine are affected by the length of the stroke. An excessively long stroke would necessitate a very thoroughly worked out crankshaft construction.

7—Valve seats are enlarged by first enlarging the valves seat orifice either with a drill or with a standard reamer. The seat reamer is then used to secure the necessary bevel for seat which will have been obliterated by use of the drill or reamer.

8—Phosphor bronze or cast iron seats are casted into an aluminum cylinder. This combination is no better than the cast iron cylinder except for the saving in weight. This construction is usually employed for aviation engines of the stationary air cooled type.

9—The method for fastening removable cylinder sleeves as used by the Premier Co. is shown in Fig. 2. A slight modification of this method is used by the Marmon Co. The cylinder block is heated slightly by passing steam through it and the sleeves are inserted, as will be seen there is a cork and a composition gasket at the bottom and a single composition gasket at the top. The Hispano-Suiza aircraft engine has its steel cylinders threaded into the aluminum water jacket.

This construction is not used in automobile engines because of its great expense.

In the Hispano-Suiza the water jackets and valve ports are cast aluminum and the individual cylinders are heat treated, steel forgings threaded into the bored holes in the aluminum casting. Each block after assembly is given a number of protective coats of enamel both inside and out baked on. Coats on the inside are applied under pressure.

"Ackerman Theory" of Steering

Q—Explain the "Ackerman theory" of steering as shown in the August 25, 1921, issue of MOTOR AGE.

2—How are crankshafts dynamically balanced?—Arthur Black, Waterbury, Conn.

1—The pivoted axle or Ackerman system of steering, as it is now called, was invented by a certain Lankensperger of Munich, as early as 1819. The theory of steering axles depends upon placing the pivot as near as possible to the center of the wheel, in order to enable the greatest arc of operation for the smallest motion of the hand or steering wheel.

The front forks on the steering system of the bicycle are typical of some makers of earlier automobiles who used steering handles similarly mounted on forks either in pairs or on a single front wheel.

Later on this gave way to the construction wherein the practice was to incline the stud axle downward at such an angle that it would cause the tire or periphery of the wheel to strike the ground at a point coincident with a line drawn through the knuckle pivot.

To prevent side slip or skidding the wheels must describe radii of different length, because two parallel wheels no matter how small the distance separating them cannot run in the same tire track.

The wheel axles or spindles must project from the main axles at different angles because the two wheels having the same diameter will with any other arrangement fail to run in the same curve. This same principle is used in the construction of railroad car wheels although the application is different.

The car wheels being rigidly attached to a common axle would tend to slip and grind when turning a curve if no attempt were made to compensate for the variation in arc between the inside wheel and the outside wheel.

This compensation is secured by constructing each wheel in the shape of a cone which will allow the two wheels to describe concentric arcs when rounding a curve. In turning a curve the outer wheel, due to centrifugal force, rotates on its largest diameter while the inner wheel for the same reason rotates on its smallest diameter.

When the path of a car's travel is changed from the straight ahead direction to a curve it is evident that the inner wheel describing the smaller arc should have a greater angle at the axle than the outer wheel which moves on the larger of the two concentric arcs. It is evident that to secure this variable angle of the spindle or stub axles it will be necessary to change the relative angles of the steering or spindle arms attached to the spindle or stub axle.

Because if they were both at right angles to the axle both wheels would move an equal relative angular distance. The Ackerman system is to incline the two steering arms inward from the right angle and to make a transverse connecting rod or drag link shorter than the distance between the king bolts or axle pivots. This is done if the connecting rod or drag link is installed behind the axle.

However, if the rod or drag link be installed forward of the axle the spindle or steering arms are inclined outward.

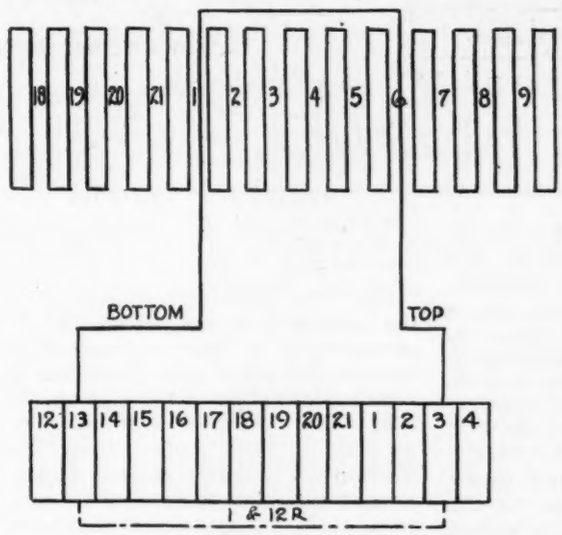
Now if with the spindle arms so located the car or vehicle is turned from a straight path the arm of the inner wheel will move away from the right angle to the immovable axle whilst the outer arm will move towards a position at right angles to the axle. Consequently a greater angular inclination from the axle of the inner wheel will be accomplished and the proper difference for all usual usual conditions between the angles will be approximated.

Although the system works best on turns the lack of parallelism of the wheels when the vehicle is traveling in a straight path is negligible and not detrimental. This is the Ackerman system of steering and it may be identified by the fact that the steering or spindle arms if projected would intersect approximately at the center point of the rear axle. The degree of variation being due to different lengths of wheelbase.

2—Crankshafts are dynamically balanced in modern factories today by means of a specially constructed dynamic balancing machine. They operate on the principle that an unbalanced shaft when in motion will tend to move toward the direction of unbalance. These machines are so constructed that the direction and exact location of the weight to be removed are registered on the machine.

A simple form of dynamic balancing machine is where the crankshaft is rotated at any certain number of revolutions while being supported by two flexible pivots one at either end.

The amount of deflection from a certain position is noted and this is corrected.


18 19 20 21 1 2 3 4 5 6 7 8 9
BOTTOM
TOP
12 13 14 15 16 17 18 19 20 21 1 2 3 4
1 & 12 R
GENERATOR
MAKE FORD
TYPE. 1920 MODEL.
SLOTS. 21
SEGMENTS 21
COIL PITCH 1 & 6.
COIL PER SLOT. 1.
TURNS PER COIL 9.
WIRE SIZE 16.
WIRE INSUL D.C.C.
COMM. CONN. 1 & 12 R.
TOP LEAD, 3 R. OF NO. 6 S
BOTT LEAD. 10 L. OF NO. 6 S
POLES 4
VOLTS 6
WINDING 1.2.3. ETC
REMARKS. NO. 1 SLOT IS THE BOTTOM OF COIL NO 1 SEG AT THE TOP OF COIL.

FORD GENERATOR ARM WINDING DIAGRAM

FORD ELECTRICAL QUESTIONS

Q—What size wire is the armature of a Ford generator wound with?

2—How many slots and how many commutator bars does it have?

3—What is the back and what is the front pitch?

4—How is it wound, wave or lap winding?—Ariel G. Olson, Racine, Wisc.

All of the above questions are answered by diagram above which shows not only the connections but gives all of the information necessary.

ANOTHER CHEVROLET RACING CAR

Q—What h.p. does Chevrolet F. B. develop and at what number of revolutions per minute does it reach its peak of power? What are the extreme revolutions it will turn over?

2—How much larger would it be possible to make the valves without boring into water jacket?

3—How much would the speed of engine be increased by the use of larger valve and aluminite connecting rod and aluminite pistons?

4—Do Dow Metal pistons expand as much as aluminite or do they expand at all?

5—Do Dow Metal pistons wear as well as iron pistons? Do aluminite pistons wear as long as iron pistons?—J. W. Hunter, Greenville, Tenn.

1—Approximately 37 h. p. at 2200 r.p.m. The maximum is about 2600.

2—Approximately ⅛ to 5/32 larger valves should be fitted.

3—We have no accurate figures on the increase in speed of the engine but would say that you should secure an additional 150 revolutions per minute.

4 and 5—Dow Metal does not expand quite as much as aluminite. Regarding their wearing qualitities it is impossible to state as they have not been used in sufficient quantities or over a sufficiently long period of time to compare it to the wear of the cast iron piston. However, these pistons have been used by some of the most successful racing cars.

REVIVING A BURNED CAR

Q—We have a model B36 Buick roadster which has been badly burnt about the engine and cowl destroying the instruments and ignition coil. The motor generator is all right, however, and we wish to use with it switch panel including the ammeter from a model D 45 Buick. We also have a Jefferson replacement coil with condensor inside of it and would also like to use this coil, as the regular condensor is shorted. Give us a wiring diagram showing how to make this combination of instruments and also advise whether ammeter will show both charge and discharge or one reading only?—Ivor M. Moot, Minneapolis, Minn.

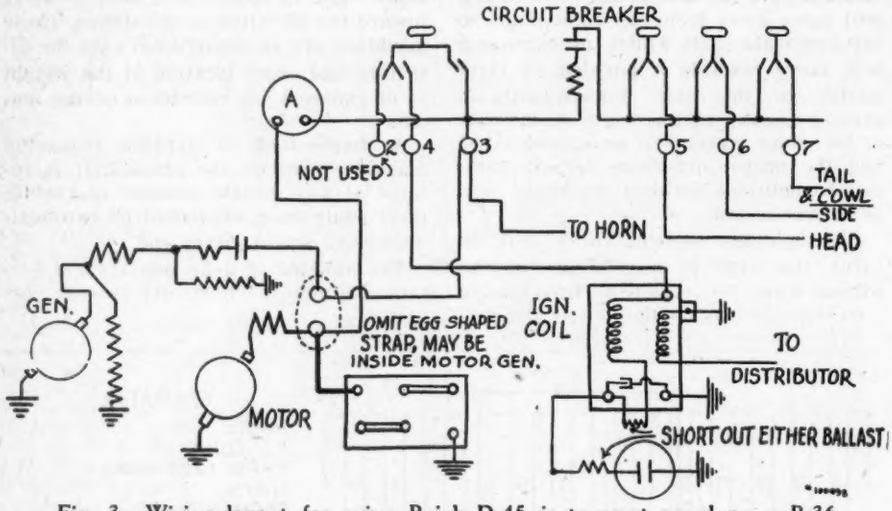


Fig. 3—Wiring layout for using Buick D-45 instrument panel on a B-36 roadster

1—We are showing sketch herewith giving wiring diagram you require. You will note that on the side of the motor generator is a large terminal, also a small one right near it and these two terminals are normally connected by an egg shape copper strap which may be outside of the generator where it is visible or else inside of the generator.

In order to have the ammeter work it is absolutely essential that this copper strap be removed after which the car can be wired up as shown in the sketch. If the ammeter reads in the wrong direction it will only be necessary to reverse the wire that goes to the number 3 terminal on the switch with the wire which goes to the ammeter and this will reverse the ammeter reading.

Note that with this system of connection it is not necessary to put any wire on the number 2 switch terminal. You did not give any description of the Jefferson replacement coil except to state that it had a condenser so we are showing a possible wiring of this coil but some slight variation may be necessary if the internal circuits of your coil are different.

We have shown a replacement coil which already has a ballast and in this case there would be two ballasts in series which would not give quite enough current to the primary winding so that the one or the other should be shorted out or else removed and replaced with a piece of copper wire. The ammeter as shown will read both charge and discharge current. If the cut-out inside of the motor generator should at any time give trouble it would be possible to short it out or fasten its points together and then move the wire from the number 3 terminal of the lighting switch over to the number 2 terminal as the action of the ignition button would connect the generator to the battery at the same time that current was taken to the ignition coil. Under these circumstances the horn connection would continue to be on the number 3 terminal.

DIRECT FAN DRIVING

Publish illustration of different clutches used for driving fan direct without using belt drive.—P. Smith, Wilkes-Barre, Pa.

Only one illustration is available of this method of driving the fan and it is shown in Fig. 4. However, the Cadillac, Lincoln and some other cars use the direct drive method of fan driving. The illustration in Fig. 4 shows the drive used on the Wills Sainte Claire Eight. The fan has a bronze bushing which is pressed into the fan hub.

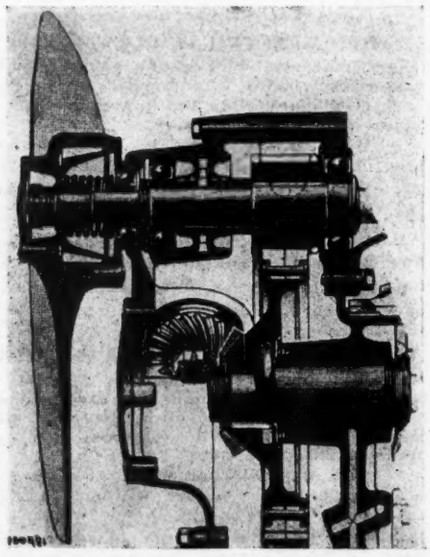


Fig. 4—Sectional view of direct fan drive as used on Wills Sainte Claire

The fan is pulled backward against the steel cone of the fan shaft by a spring. When in action the fan tends to move ahead on its shaft and when the speed reaches a certain value the forward pull of the fan due to the reaction of the air is stronger than the backward pull of the fan spring.

The fan is then pulled off the steel cone and is allowed to slip on its driving cone. When the engine revolves below this speed the backward pull of the spring overcomes the forward pull of the fan and the fan reseats itself.

To prevent any seizing from the fan shaft cone both surfaces are lubricated by oil delivered to the hollow fan shaft. As the speed of the fan cannot exceed a certain set limit, the power absorbed when driving the fan is also limited regardless of how fast the engine may rotate.

The speed at which the fan is released is regulated by the spring tension and is generally about 2000 engine revolutions which is equivalent to 3000 fan revolutions per minute. The fan is a three blade type and is driven off the timing gear set. A description of the Cadillac and Lincoln fan drive can be secured from the respective factories.

LATE TIMING OF 1920 HUPMOBILE

Q—We have a 1920 Hupmobile that has recently had the engine completely overhauled and when the job was finished the car ran fine. A few days after the customer had taken the car from our shop he brought it back and we found that the engine was running poorly. New interrupter points were installed and the engine was again all right. A few days later the car was again brought back with the engine working poorly and after much trouble it was finally found that the timing was late. This was corrected and the engine again operated as it should. We would like to know how the timing could change and become late without anyone touching it.—A Reader, Lagro, Ind.

1—On the 1920 Hupmobile silent chain drive is used at the front end of the engine making a triangle drive from the crankshaft to the camshaft to the generator shaft and back to the crankshaft, the adjustment being made by loosening the upper two bolts on the generator bracket and rocking the generator away from the engine to tighten the chains. With chain drive of this type there is bound to be a slight amount of wear in the many small joints in the chain so that it is occasionally necessary to tighten the chains as above indicated.

We think it very likely that the chain has been allowed to become too loose and has slipped or jumped, which would allow not only the ignition but also the camshaft to be timed too late. The ignition unit itself is driven by a pair of spiral gears at the rear end of the camshaft and it is, of course, possible that the key has been left out of the spiral gear on the camshaft or that it has sheared while it is also possible that the spiral gear on the ignition shaft itself is slipping occasionally. These three suggestions seem to be the only possibilities of such trouble, the most likely one being the slipping chain.

DETROIT GENERATOR DIAGRAM

Q—Print diagram showing both the internal and external circuits of the Detroit motor generator with Ward Leonard regulator used on the 1915 Saxon roadster.—Seymour Motor Car Co., Seymour, Wis.

Diagram requested is shown in Fig. 5.

NEGATIVE AND POSITIVE BATTERIES DISCUSSED

Q—Some cars use battery with positive grounded and others use battery with negative grounded. Is there any advantage in either method?—John Maghirell, New York City.

A—There is no particular advantage in grounding, either plus or minus terminal of the battery, it being merely a matter of custom to use either one method or the other with certain cars and certain electrical systems, this being done for the sake of uniformity. In the event that a battery is removed and replaced and the electrician is not sure whether the battery is properly connected it is always possible to check connections by turning on the lights and observing indication of ammeter.

If with the light turned on the ammeter goes to the charge side instead of discharge side it shows that the battery is put in wrong and should be reversed. As far as the generator is concerned it usually makes no difference which way the battery is installed if the cutout points are closed by hand to allow the battery current to magnetize the generator in the right direction. If charging current will make the ammeter read discharge and the discharge current going to lamps from the battery will make the ammeter read charge, it shows battery is put in wrong.

IGNITION TROUBLE WITH 1918 STEPHENS

Q—We have a Stephens Six, 1918 model, on which we are unable to get any spark from the coil. When ignition switch is turned on the ammeter shows 15 amperes discharge. Is this normal for the ignition system on this car?

2—Sometimes the starter will work and other times it will not. Will you give us a reason for this?

3—Sometimes the engine will run for a while and at other times it will not run.

4—We cannot keep the battery up in a charged condition. What is a likely reason for this?—Wirth & Griebel, Sunbury, Iowa.

1—In the Delco system used on the Stephens 1918 Six, it is normal for the ammeter to show about 15 amperes discharge when the ignition switch is turned on as this connects the battery to both the ignition coil and the generator. As soon as the engine starts, however, the generator should charge and the 15 amperes discharge reading should swing over to 12 or 15 amperes on the charge side of the meter. To test the ignition the wire should be disconnected from the generator temporarily but the engine should not be run for any length of time with this wire removed or the generator will burn up. With this wire disconnected and the ignition switch turned on the engine should be turned slowly by hand and the ammeter should first show about 5 amperes discharge and then zero, as the interrupter points close and open.

If this test seems to be all right the distributer cap should be removed and the interrupter points closed and opened by hand at the same time holding the high tension wire which is normally connected to the center of the distributer cap within about 3/16 of an in. of the engine, so as to make a spark gap. Then as the interrupter points are opened and closed sparks should jump at this improvised gap, showing that the coil is giving a high tension spark. If this test shows that the coil seems to be all right the wire should again be connected to the center of the distributer and the engine run, the spark being now checked up at each spark plug.

If the sparks at the plugs are at first all right and later get weak and cause engine to miss or perhaps even stop, it shows that the coil is defective and should be replaced with a new one, for it sometimes happens that a coil will work all right while it is cold but breaks down as soon as it begins to warm up.

2—When the starter does not operate it is possible that there is a poor connection in the wiring. Most likely a corroded terminal at one end of the battery or a poor connection at the ground. Would also suggest that you check up the method of testing starting motors given in recent issues of MOTOR AGE which give descriptions of various electrical systems.

3—Running of engines at times and not at other times may be due to failure of ignition caused by defective coil.

4—Inability to keep battery charged may be due to a number of causes. If the battery is old it may be that the condition of the plates is such that it will not hold the charge.

It is also possible that there is a short in the wiring which drains the charge from the battery. We would suggest your disconnecting one of the cables from the battery and connecting an ammeter in series with the wiring to see if there is any leakage of current. Would also suggest your checking with the ammeter on the car to see that the generator is charging and even if it is charging the battery may run down if the car is not run very much.

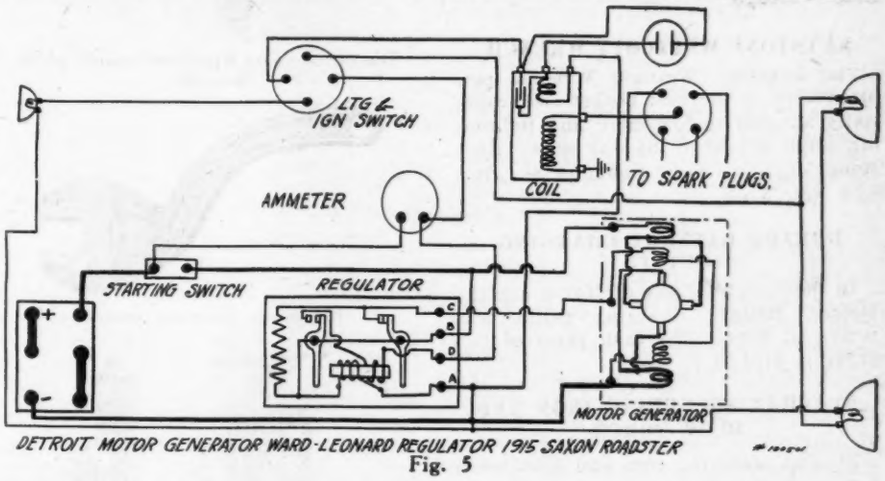


Fig. 5

REBUILDING A 1912 CADILLAC

Q—We have rebuilt a 1912 Cadillac into a speedster but we cannot get the engine to function properly. Number three cylinder does not cut in until the engine is warm. Also the engine does not idle well. We have an old style of carbureter on it and are wondering if this has something to do with the irregular running of the engine.

2—Where can we get an exhaust manifold for this engine. We want one which carries the exhaust around the outside of the body as in racing cars.

3—Would replacing the old pistons with light gray iron pistons throw the engine out of balance? If we regrind the cylinders, fit new pistons, balance each connecting rod and piston what maximum speed might we expect with the stock gear ratio and 37x5 tires? Also, should we change the flywheel?—C. L. Forney, Ft. Collins, Colo.

A—The best thing we can suggest to improve the operation of your engine is a hot spot device which is introduced between the carbureter and intake manifold. One of the difficulties encountered with old engines is that they cannot properly handle modern fuel unless certain changes are made in them, such as the addition of a hot spot. In the year when your engine was built we had fuel which could be vaporized quite readily and the subject of heating fuels was not given much attention.

2—We do not believe you are able to buy ready made an exhaust manifold such as you ask about. In the case of race cars the manifolds and exhaust pipes are always made up special, usually of steel tubing with welded joints.

3—It will be perfectly all right for you to replace the old pistons with pistons of lighter construction and you will not upset the balance of the engine by so doing. In fact if the job is properly done you should improve the running of the engine. Better leave the connecting rods as they are.

You cannot expect to increase the revolutions per minute of this engine to such an extent that it would justify drilling the connecting rods. It is a dangerous procedure unless you know what you are doing. There is no direct way of telling the maximum speed of this car because naturally the factors vary to a great extent. You might be able to get about 60 miles per hour from this car. Leave the flywheel as it is.

SERVICE EQUIPMENT

Aids for Time Saving & Accuracy

BEACON VISIBLE OIL DISPENSER

Beacon Visible Oil Dispenser is composed of two chambers, the upper is of glass with a capacity of one gallon and the lower, a casting constructed, vermillion painted container will hold ten gallons.

The upper chamber has an electric light in the center of it which shows the amount of oil being pumped out. Servus Station Supply Co., Harris Trust Bldg., Chicago.

KEYSTONE WESTCOTT WRENCH

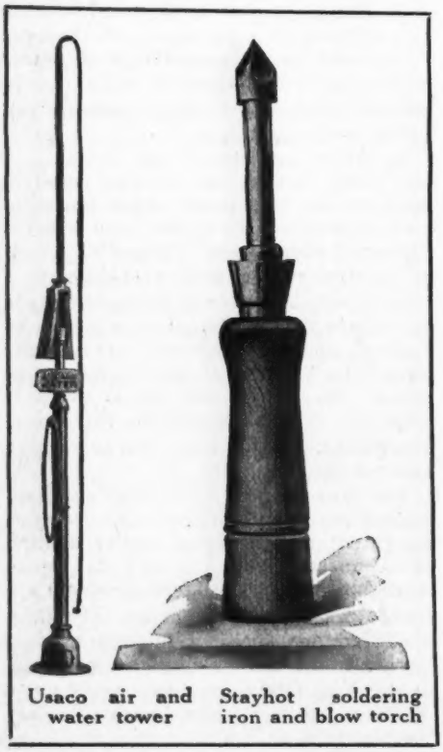
The Keystone Westcott Wrench, pictured here, is the vest pocket size, especially adapted to loosening and tightening small or out-of-the-way nuts. Keystone Mfg. Co., 41-51 Chandler st., Buffalo, New York.

HOBART BATTERY CHARGING OUTFIT

In the March 9 issue of MOTOR AGE the Hobart Battery Charging Outfit was priced at $144. The cash price of this outfit is $161.50.

STAYHOT SOLDERING IRON AND BLOW-TORCH

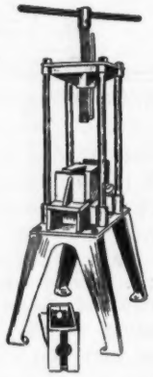
Stayhot soldering iron and blow-torch burns denatured alcohol and is made in two sizes by the Thermo-Gas Products Co., Inc., Brooklyn, N. Y.



Usaco air and water tower — Stayhot soldering iron and blow torch

Dorrance valve lifter and spark plug wrench

Keystone Westcott wrench

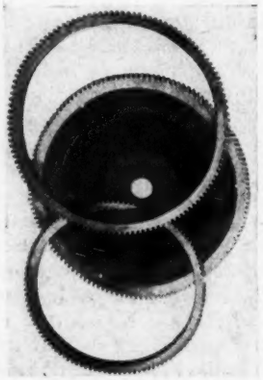


Whitney arbor press

Beacon visible oil dispenser

MEACHEM STEEL GEAR RIMS

Meachem steel gear rims for flywheels. Meachem Gear Corp., 411 Canal st., Syracuse, N. Y.



Meachem steel gear rims

WHITNEY ARBOR PRESS

The base of this press is provided with ways like those of a lathe permitting the blocks to slide into various positions, offering a firm foundation for all work. A large recess through the base is provided to allow the passage of shafts, gears, etc.

The screw has a square thread, thus reducing wear to a minimum, the head being supplied with recesses allowing the use of two bars when exceptionally strenuous pressure is necessary.—R. S. Whitney Mfg. Co., Lewistown, Me.

USACO AIR AND WATER TOWER

The Usaco Air and Water Tower is full revolving and will serve a car at any point within a diameter of 34 feet. It is equipped with a cushion stop which checks the return movement of the arm, preventing the hose from lashing and avoiding all shock to the tower. The water hose is equipped with a compression faucet which permits filling radiator without splashing.—U. S. Compressor Co., Cleveland.

USACO SINGLE STAGE COMPRESSORS

The new Usaco single stage air compressors are made in one and two cylinders, either gear or belt driven from the motor and in both stationary and portable form. The line comprises 10 compressors covering practically every need.—U. S. Air Compressor Co., Cleveland.

DORRANCE VALVE LIFTER AND SPARK PLUG WRENCH

The Dorrance valve lifter is designed for automobile and stationary gasoline engines, weight 1¼ lbs. Price, $1.

The spark plug wrench fits all plugs, is made of malleable iron, nickled, has self-adjustable reversible ends, $0.80. Chas. J. Dorrance, Chicago, Ill.

Usaco single stage air compressor

The ACCESSORY SHOW CASE

New Sources of Retail Profit

MANSFIELD CLOCKS

The Glownite motor clock is a radium-dial timepiece, made of nickel silver. It may be attached in a few minutes by means of three small bolts and nuts—without cutting a large hole in the instrument board and cannot be removed without taking considerable time and trouble. Mounted in vibration-proof case, the works are protected from shock. This clock sells for $4.

The Paramount is a trim silvered-dial clock, with numerals clearly outlined. Aside from the dial and a slight difference in shape, it is similar to the Glownite in all respect. Its price is $3.

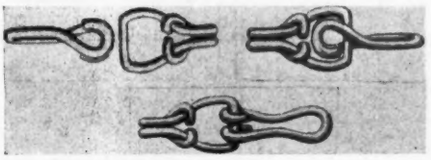
J. F. Mansfield, 9 Maiden Lane, New York City.

ALL WRIGHT RADIATOR CORES

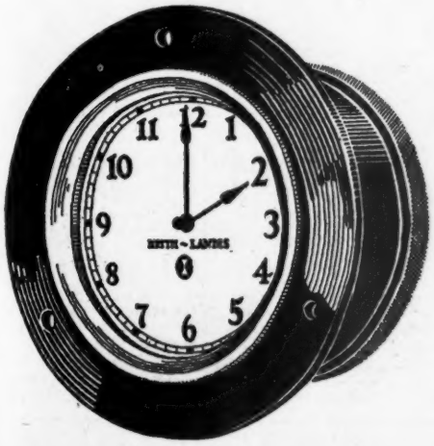
The All Wright cores for truck, passenger car and tractor radiators, are made from 85 per cent pure Lake copper and come in all models for all makes of cars, trucks and tractors. The illustration shows a core for the Hudson Super Six. All Wright Core & Equip. Co., Winfield, Kans.

UNIVERSAL TIRE CHAIN

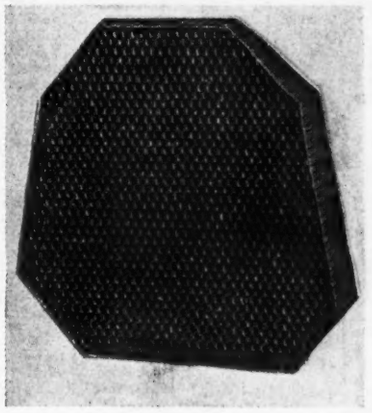
The Universal tire chains are made in such a manner that they can be disconnected, one link at a time, thus a broken or damaged link can be replaced with very little trouble. Another feature is the swiftness with which they can be taken off and put on. The illustration shows how the links are put together. Universal Chain Co., 38 S. Dearborn St., Chicago, Ill.



Universal tire chain



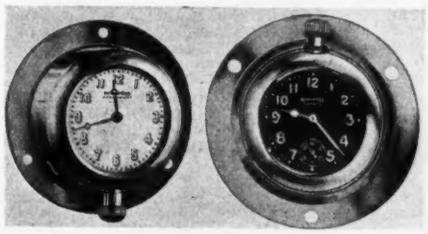
Keith-Landis electric clock



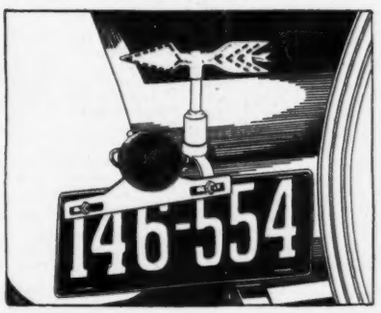
All Wright radiator core

Hy-Lo automobile bumper

Diuguid fender mirror



Mansfield clocks



Telem arrow

HY-LO AUTOMOBILE BUMPER

This design bumper has a large amount of cushion area and the central located Hy-Lo spring is placed in a floating position which allows it to equalize the impact. This equalizing condition is made possible by the spring member being anchored at the two extreme ends only and the middle portion being held in position by a clamp which will slip to the required position when the bumper is under impact. Automobile Bumper Co., Grand Rapids, Mich.

TECHNICAL PRODUCTS SPARK PLUG

Technical products spark plugs are made under heat and low temperature tests. A furnace at 1000 deg. Fahrenheit is used to test the plug and porcelain against heat before sending it out. Technical Products Co., 1335 Plain View St., East End, Pittsburgh, Pa.

TELEM ARROW

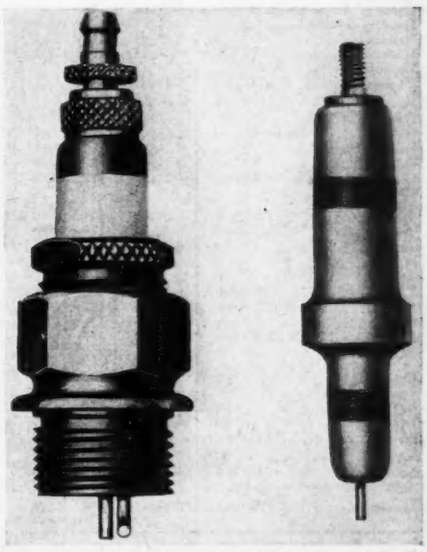
Telem Arrow is used in the same capacity as the stop light, it being controlled by a switch on the wheel or dash. Both front and rear signals can be used. Price, $18, complete. Telem Arrow Co., 2 Fifth Ave., Brooklyn, N. Y.

DIUGUID FENDER MIRROR

The base or body of this fender mirror is an aluminum casting, highly polished, and is easily attached to fender in a new way. Price, including cable and switch, $10.—Diuguid Bros., 975 Atlantic avenue, Brooklyn.

KEITH-LANDIS ELECTRIC CLOCK

Keith-Landis clock is electrically wound and operated. Made in sizes for all cars. Keith-Landis Corp., Chicago. Price $35.



Technical Products spark plug

Specifications of Current Passenger Car Models

NAME AND MODEL	Engine Make	Cylinders, Bore and Stroke	WB	Tires	2-Pass.	5-Pass.	7-Pass.	Coupe	Sedan
Ace.....F	G-B	4-3½x5	114	32x4	$1295	$1295	....	....	$2295
Ace.....L	H-S	6-3¼x5	117	32x4	2260	2260	....	....	3680
Ace.....C	Cont.	6-3⅝x5¼	123	33x4½	2975	2975	....	....	4500
Ambassador.....R	Cont.	6-3⅝x5¼	136	33x5	....	‖4500	$4500	....	6500
American.....C	H-S.	6-3¼x5	127	32x4	2195	2195	‡2250	....	3150
Anderson.....Series 40	Cont.	6-3¼x4½	120	33x4	2195	1650	1795	$2450	2550
Apperson.....8-21-S	Own.	8-3¼x5	130	34x4½	....	2620	2645	3625	3695
Auburn.Beauty-Six.6-51	Cont.	6-3¼x4½	121	32x4	1575	1575	1615	2275	2395
Auburn.....Beauty Six	Cont.	6-3¼x4½	121	32x4½	....	‡2195	....	....	....
Beggs.....20T	Cont.	6-3¼x4½	120	33x4	1775	1520	....	2320	2420
Bell.....4-32	H-S.	4-3½x5	114	31x4	1195	1195	....	....	....
Bell.....6-50	H-S.	6-3¼x5	124	32x4	1545	1545	....	....	....
Biddle.....B1 & B5	Buda.	4-3⅝x5½	121	32x4	2950	‡2950	....	3950	3950
Brewster.....91	Own.	4-4 x5½	125	32x4½	‖6000	6000	....	....	9200
Buick.1922-34-35-36-37	Own.	4-3⅝x4¾	109	31x4	895	935	....	1295	1395
Buick.....1922-44-5-6-7	Own.	6-3⅜x4½	118	33x4½	1365	1395	....	1885	2165
Buick.....1922-48-9-50	Own.	6-3⅜x4½	124	34x4½	1785	....	1585	2075	2375
Cadillac.....61	Own.	8-3⅛x5¼	132	33x5	3100	3150	3150	3925	4100
Case.....X	Cont.	6-3¼x4½	122	32x4½	....	1890	....	....	2790
Case.....V	Cont.	6-3½x5¼	126	34x4½	....	....	1935	2585	2990
Chalmers.....1922	Own.	6-3¼x4½	117	32x4	1245	1295	1395	1995	2295
Chalmers.....1922	Own.	6-3¼x4½	122	32x4	....	....	1395	....	....
Champion.....Tourist	Lyc.	4-3½x5	113	32x3½	....	995	†995	....	....
Champion.....Special	H-S.	4-3½x5	118	32x4	‖1095	1095	....	....	....
Chandler.....Six	Own.	6-3½x5	123	33x4	1595	1595	1695	2295	2395
Chevrolet.....490	Own.	4-3‖x4	102	30x3½	525	525	....	875	875
Chevrolet.....FB	Own.	4-3‖x5¼	110	32x4	975	975	....	1575	1575
Cleveland.....41	Own.	6-3 x4½	112	32x4	1175	1195	....	1550	1595
Climber Four.....K	H-S.	4-3½x5	115	33x4	1385	1385	....	....	....
Climber Six.....S	H-S.	6-3¼x5	125½	32x4½	2250	‡2250	....	3000	3100
Cole.....890	Nort.	8-3½x4½	127¼	33x5	2485	‡2485	2485	3185	3685
Columbia Challenger....	Rut.	6-3½x5	115	32x4	....	1195	....	‖1995	1995
Columbia.....D-C&CS	Cont.	6-3¼x4½	115	32x4	1475	1475	‡1475	‡2295	2350
Comet.....C-53	Cont.	6-3½x5¼	125	33x4½	....	1085	2085	....	2985
Crawford.....22-6-60	Cont.	6-3½x5¼	122½	32x4	3000	3000	3000	....	4500
Daniels.....D-19	Own.	8-3½x5¼	132	34x4¼	4350	4350	4350	5250	5950
Davis.....71	Cont.	6-3½x4½	114	31x4	....	1195	....	....	....
Davis.....61-67	Cont.	6-3¼x4½	120	33x4	1595	1595	‡1605	2095	2195
Dixie Flyer.....H-S-70	H-S.	4-3½x5	112	32x4	1095	1095	‡1295	1545	1595
Dodge Brothers.....	Own.	4-3⅞x4½	114	32x4	850	880	....	1280	1440
Derris.....6-80	Own.	6-4 x5	132	33x5	....	‖4785	4785	5800	7190
Dart.....19-14	D-Ly.	4-3½x5	108	31x4	865	865	....	1315	1445
Driggs.....	Own.	4-2⅝x4½	104	30x3½	1275	1275	....	....	1975
Duesenberg...Straight 8	Own.	8-2⅞x5	134	33x5	6500	6500	6750	7800	7800
Du Pont.....A	Own.	4-3‖x5¼	124	32x4½	3000	3200	....	3800	4000
Durant.....A-22	Own.	4-3⅛x4¼	109	31x4	....	890	....	1365	1365
Durant.....B-22	Anst.	6-3¼x4½	123	32x4½	1600	1650	....	2250	2400
Earl.....40	Own.	4-3 7/16x5¼	112	32x4	1485	1185	....	....	1895
Elcar.....K-4	Lyc.	4-3½x5	118	33x4	1095	1095	‖1095	1345	....
Elcar.....7-R	Cont.	6-3¼x4½	118	33x4	1395	1395	‖1395	2065	2165
Elgin.....K-1	Falls.	6-3⅛x4¼	118	33x4	1345	1295	‖1345	2195	2195
Essex.....	Own.	4-3½x5	108½	32x4	1095	1095	....	1345	1895
Falcon, H.PM.... 12-D22	Own.	4-2¾x4	100	27x3½	2800	‡3000	....	....	4000
Ferris.....Series 60	Cont.	6-3½x5¼	130	32x4½	2575	....	2475	....	3475
Ferris.....Series70	Cont.	6-3⅝x5¼	130	32x4½	2895	....	2795	....	3895
Ford.....T	Own.	4-3⅜x4	100	30x3½	**319	‖‡348	....	580	645
Franklin.....9-B	Own.	6-3¼x4	115	32x4	2400	2450	....	3200	3450
Gardner.....T-R & G	Lyc.	4-3½x5	112	32x3½	895	895	....	....	1595
Goodspeed.....	Own.	4-3⅝x5½	124	32x4½	3985	3785	....	....	....
Grant.....	Own.	6-3⅞x4½	116	32x4	1385	1385	....	1895	1945
H.C.S.....	Weid.	4-3⅝x5½	120	32x4½	2400	2400	....	2850	3150
Halladay.....4	Own.	4-3½x5	115	32x4	1095	1095	....	1990	2085
Halladay.....6	Own.	6-3½x5	115	32x4	1595	1595	....	2295	2395
Handley-Knight.....	Kn'ht.	4-4½x4½	125	32x4½	....	....	2650	3450	3450
Hansen.....30	Cont.	6-3½x4¼	112	31x4	....	995	....	....	....
Hanson Six.....60	Cont.	6-3¼x4½	121	32x4	1595	1595	1795	‡2475	2585
Hatfield.....A-42	H-S.	4-3½x5	115	32x4	‡1315	1315	....	1950	1950
Haynes.....75	Own.	6-3½x5 3/16	132	34x4½	2595	‡2395	2395	....	3395
Haynes.....55	Own.	6-3½x5	121	33x4	1645	1595	....	2295	2595
Haynes.....48	Own.	12-2¾x5	132	34x4½	2895	3595	2895	....	3895
Holmes.....Series 4	Own.	6-3½x4¼	126	34x4½	‡2950	....	2950	3850	4150
Hudson Super 6.....	Own.	6-3½x5	126	34x4½	‡1695	1795	1745	2570	2650
Huffman.....R	Cont.	6-3¼x4½	120	32x4	1845	1795	....	....	2795
Hupmobile.....Series R	Own.	4-3¼x5½	112	32x4	1250	1250	....	1835	1935
Jackson.....638	H-S.	6-3¼x5	121	32x4½	‡1685	1485	....	2985	2985
Jordan.....MX	Own.	6-3 1/16x4¾	120	32x4	2095	2095	....	3200	3200
Jordan.....F	Cont.	6-3½x5¼	127	32x4½	....	....	2475	....	3500
Kenworthy.....8-90	Own.	8-3 x5¼	130	32x4½	5000	5000	5250	6000	6000
King.....K-1922	Own.	8-3 x5	124	32x4½	2140	‡2125	*2125	3125	3235
Kissel.....45	Own.	6-3 1/16x5½	121	32x4½	2675	2675	2175	3275	3475
Kline Kar.....6-55-K	Cont.	6-3¼x4½	117	33x4	1790	1790	1790	2850	2890
LaFayette.....	Own.	8-3¼x5¼	132	33x5	3985	†4090	4090	5000	5175
Leach.....999	Own.	6-3 1/16x5¼	134	32x4½	6500	6500	6500	6500	6500
Lexington.....	Anst.	6-3¼x4½	122	32x4	....	1985	....	....	....
Lexington.....	Anst.	6-3¼x4½	128	32x4½	....	....	2285	....	3350
Liberty.....10-D	Own.	6-3½x5	117	33x4½	1295	1295	‡1345	2085	2245
Lincoln.....	Own.	8-3⅝x5	136	33x5	‡3800	3300	3300	3900	4200
Locomobile.....48	Own.	6-4½x5½	142	35x5	....	†7600	7600	10500	‖11000
Malbohn.....B	Own.	6-3½x4¼	116	32x4	1395	1395	‡1495	2165	2165

NAME AND MODEL	Engine Make	Cylinders, Bore and Stroke	WB	Tires	2-Pass.	5-Pass.	7-Pass.	Coupe	Sedan
Marmon.....34	Own.	6-3 1/16x5¼	136	32x4½	$3700	†3700	$3700	$4700	$5150
Maxwell.....	Own.	4-3⅛x4½	109	31x4	885	885	....	1385	1485
McFarlan.....1921	Own.	6-4½x6	140	33x5	6300	‡6300	6300	7500	7500
Mercer.....Series 5	Own.	4-3¾x6¾	132	32x4½	3950	‡3950	*3950	4850	5250
Merit.....	Cont.	6-3¼x4½	119	32x4	1895	1895	....	....	7000
Meteor.....R & RR	Dues.	4-4½x6	129	32x4½	5000	5000	....	....	....
Mitchell.....F-50	Own.	6-3½x5	120	33x4	‖1490	1490	‡1600	2050	2275
Mitchell.....F-50	Own.	6-3½x5	127	33x4	....	....	1690	....	....
Monroe.....1922-S-13	Own.	4-3¼x4½	115	32x3½	875	875	....	....	....
Moon.....6-40	Cont.	6-3⅜x4¼	115	31x4	....	1295	....	....	....
Moon.....6-48	Cont.	6-3¼x4½	122	32x4	1785	1785	2285	2785	2785
Moon.....6-68	Cont.	6-3½x5¼	125	32x4½	....	....	2285	....	....
Murray-Mac Six.....	Own.	6-3½x5¼	128	34x4½	4250	4250	4250	....	....
Nash.....691-96-97	Own.	6-3¼x5	121	33x4	1360	1390	†1540	....	....
Nash.....692-94-95	Own.	6-3¼x5	127	34x4½	....	....	1540	2090	2390
Nash Four.....41-4	Own.	4-3⅜x5	112	33x4	965	985	....	1485	1645
National.....BB	Own.	6-3½x5¼	130	32x4½	2750	‡2750	2750	3890	3990
Noma.....3C	Bea.	6-3¼x4½	128	32x4½	2000	‡2100	*2200	....	3200
Noma.....1D	Cont.	6-3½x5¼	128	32x4½	3000	‡3100	*3200	....	5500
Norwalk.....430-KS	Lyc.	4-3½x5	116	32x3½	....	1035	....	....	....
Oakland.....6-44	Own.	6-2 13/16x4¾	115	32x4	1120	1145	‡1265	1685	1785
Ogren.....6 T De Luxe	Cont.	6-3⅝x5¼	134	33x5	†3750	3750	3850	4500	4800
Oldsmobile.....43-A	Own.	4-3 7/16x5¼	115	32x4	‖1145	1145	....	1645	1795
Oldsmobile.....46	Own.	8-2 7/16x4¾	122	33x4½	....	‖1735	1735	....	2635
Oldsmobile.....47	Own.	8-2 7/16x4½	115	32x4	1595	1595	....	2145	2295
Overland.....4	Own.	4-3⅜x4	100	30x3½	550	550	....	850	895
Packard.....Single-Six	Own.	6-3⅜x4½	116	33x4½	2350	2350	....	3125	3350
Packard.....Twin Six	Own.	12-3 x5	136	35x5	3850	3850	3850	5240	5400
Paige.....6-44	Own.	6-3¼x5	119	32x4	1465	1465	....	1995	2245
Paige.....6-66	Cont.	6-3⅜x5	131	33x4½	‖2245	‖2495	2195	3100	3155
Paterson.....22-6-52	Cont.	6-3¼x4½	120	32x4½	....	1550	1585	2595	2595
Peerless.....56-S-7	Own.	8-3¼x5	125	34x4½	....	‡2790	2790	3500	3790
Piedmont.....4-30	Lyc.	4-3½x5	116	32x3½	....	970	....	....	....
Piedmont.....6-40	Cont.	6-3⅜x4½	122	32x4	....	1285	....	....	....
Pierce-Arrow.....	Own.	6-4 x5½	138	33x5	7000	‖6500	6500	8000	8500
Pilot.....6-45	Teeter	6-3½x5	120	32x4	†1500	1500	....	....	....
Pilot.....6-50	H-S.	6-3½x5	126	32x4½	2050	2000	2050	2950	3000
Porter.....46	Own.	4-4 5/8 x6¾	142	35x5	6750	6750	....	....	7800
Premier.....6-D	Own.	6-3⅝x5½	126¾	33x5	3150	‡3100	3250	....	5000
Premocar.....6-40 A	Falls.	6-3⅛x4¼	117	32x4	1095	1095	1195	1750	1825
R & V Knight.....R	Own.	4-3⅜x5	116	32x4	....	1850	....	2650	2750
R & V Knight.....J	Own.	6-3 1/16x5½	127	32x4½	2750	‡2750	2750	3350	3450
Reo Series...B-T6 & U6	Own.	6-3 1/16x5	120	33x4	1595	....	1595	2355	2435
ReVere.....C	Dues.	4-4¼x6	131	32x4½	3200	3200	3200	....	4000
Rickenbacker.....A	Own.	6-3⅛x4¾	117	32x4	....	1485	....	1885	1985
Roamer.....6-54-E	Cont.	6-3½x5¼	128	32x4½	2850	‡2595	2785	3850	3850
Roamer.....4-75-E	Dues.	4-4¼x6	128	32x4½	3985	‡3585	‡3750	....	‖4650
Rolls-Royce.....	Own.	6-4½x4¾	143½	33x5	....	10,900	....	....	....
Romer.....R-22	Cont.	6-3¼x4½	120	32x4	1975	1975	2050	2400	2700
Saxon.....125	Own.	4-3½x5	112	32x4	1195	1195	....	1795	1795
Sayers Six.....DP	Cont.	6-3¼x4½	118	33x4	1695	1695	....	2795	2795
Seneca.....L & O	Lelt.	4-3⅛x4½	108	30x3½	945	945	....	....	....
Seneca.....50 & 51	Lyc.	4-3½x5	112	31x4	1095	1095	....	....	....
Southern Six.....660-2	H-S.	6-3¼x5	127	32x4½	2375	2375	2395	....	....
Sperling, A.....	Supr.	4-3⅜x5	114	32x4	980	980	....	1685	1685
Standard Sterling.....J	Own.	8-3¼x5	127	34x4½	2500	‖2500	2500	2750	3200
Stanley.....	Own.	2-4 x5	130	34x4½	2800	2600	2600	3775	3850
Stanwood Six.....	Cont.	6-3¼x4½	118	33x4	1765	1765	....	2750	....
Stearns.....SKL4	Own.	4-3⅜x5⅝	125	34x4½	2250	2250	2450	3150	3450
Stephens.....90	Own.	6-3¼x4½	122	33x4½	1675	‖1745	*1745	2650	2650
Stevens-Duryea.....E	Own.	6-4 7/16x5½	138	35x5	7250	‖6900	6800	....	‖8900
Studebaker...Light Six	Own.	6-3⅛x4½	112	32x4	1045	1045	....	1375	1750
Studebaker..Special Six	Own.	6-3½x5	119	32x4	1425	1475	‡1475	2150	2350
Studebaker.....Big Six	Own.	6-3⅞x5	126	33x4½	....	....	1785	2500	2700
Stutz.....	Own.	4-4⅝x6	130	32x4½	2950	‖2990	*2990	3990	4450
Templar.....A-445	Own.	4-3⅜x5½	118	32x4 -	2025	2125	‡2175	2785	2785
Texan.....A-38	Lyc.	4-3½x5	115	33x4	1195	1195	....	....	....
Texan.....C-12	H-S.	4-3½x5	115	33x4	1350	1350	....	....	....
Tulsa.....E-1-2-3	H-S.	4-3½x5	117	33x4	1175	1175	....	....	....
Velie.....48	Cont.	6-3¼x4½	115	32x4	1585	1585	‡1800	2485	2485
Velie.....34	Falls.	6-3¼x4½	112	32x3½	1235	1235	....	1750	2085
Velie.....58	Own.	6-3⅛x4¼	115	32x4	1395	1395	....	2085	2085
Vogue.....6-55	H-S.	6-3¼x5	124	32x4	....	1885	1960	2785	2885
Vogue.....6-66	Cont.	6-3½x5¼	124	33x4½	....	2085	2160	2885	2985
Waltham.....6	Own.	6-3¼x5	120	32x4	2350	2350	....	3050	3150
Washington.....	Cont.	6-3¼x4½	116	32x4	....	1785	....	....	....
Westcott.....C-48	Cont.	6-3½x5¼	125	32x4½	....	....	2090	....	3290
Westcott.....A-44	Cont.	6-3¼x4½	120	32x4	....	1890	....	....	2890
Wills Sainte Claire..A-68	Own.	8-3¼x4	121	32x4½	2475	2475	....	3275	3475
Willys-Knight.....20	Own.	4-3⅜x4½	118	33x4	1350	1375	....	1875	2095
Winther.....61	H-S.	6-3¼x5	120	32x4½	....	2250	....	....	....
Winton.....40	Own.	6-3¾x5¼	132	35x5	3400	‡3600	3400	4450	4550

*—6-passenger. †—4-passenger. ‡—3-passenger. **—Price without starter and demountable rims. Price with starter and demountable rims $414. ††—Price without starter and demountable rims. Price with starter and demountable rims $443. §Model 47—34 x 4½ Tires.

Engine Make: Anst—Ansted. Bea—Beaver. Cont—Continental. Curt—Curtiss. D.Ly—Dort Lycoming. Dues—Duesenberg. G-B—Grey Beal. H-S—Herschell-Spillman. LeR—Leroy. Lyc—Lycoming. Nort—Northway. Roch—Rochester. Rut—Rutenberg. Weid—Weidely. Wisc—Wisconsin.

Specifications of Current Motor Truck Models

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES Front	TIRES Rear	Final Drive
Acason	¾-1	$1650§	3¾x5	34x5†	34x5†	W
Acason, RB	1½	1950	3¾x5¼	36x3½	36x6	W
Acason, H	2½	2750	4¾x5¾	36x4*	36x8*	W
Acason, L	3½	3450	4⅜x5¾	36x5*	36x10*	W
Acason, M	5	4350	5 x6¼	36x6	40x12	W
Ace, C	1½	2295	3¾x5½	34x3½*	34x5*	W
Ace, A	2½	2795	4¼x5½	36x4*	36x7	W
Acme, G	¾	....	3¾x5	35x5†	35x5†	W
Acme, B	1	....	3¾x5	34x3½	34x5	W
Acme, F	1½	....	3¾x5	34x3½	34x5	W
Acme, A	2½	....	4⅛x5¼	36x4	36x7	W
Acme, AC	2½	....	4⅛x5½	36x4	36x7*	W
Acme, C	3½	....	4⅛x5½	36x5	40x10	W
Acme, E	5	....	4¾x6	36x6	40x12	W
American, 25	2½	3350	4 x6	36x4*	36x4d*	W
American, 40	4	4275	4½x6	36x5*	36x5d*	W
Apex, G	1	1450††	3½x5	33x5†	33x5†	I
Apex, D	1½	1915	3¾x5½	34x3½	34x4	I
Apex, E	2½	2895	4¼x5½	36x4	36x7	I
Apex, F	3½	3975	4½x6	36x5	36x10	I
Armleder, 20	1	2350	3¾x5¼	34x3½*	34x5*	W
Armleder, 21	1½	2425	3¾x5¼	34x3½	34x6	W
Armleder, 40	1½	....	4½x5¼	34x3½	36x6	W
Armleder, HW	2½	3200	4¼x5½	36x4*	36x7*	W
Armleder, KW	3½	4150	4½x6	36x5	36x5d	W
Atco, B	1½	....	3¾x5¼	34x5†	36x6†	W
Atco, B1	1½	....	3¾x5¼	34x5†	36x6†	I
Atco, A	2½	....	4¼x5½	36x4†	36x8*	W
Atlas, M.D.	1	1185	3½x5	32x4½†	32x4½†	W
Atterbury, 20R	1½	2475	3¾x5	34x3½	34x5	W
Atterbury, 7CX	2½	3175	4⅛x5¼	36x4	36x4d	W
Atterbury, 7D	3½	3975	4⅛x5½	36x5	40x5d	W
Atterbury, 8E	5	4975	4¾x6	36x5	40x6d	W
Autocar, 21UF	1½-2	1950	4¾x4½	34x4*	34x5*	D
Autocar, 21UG	1½-2	2050	4¾x4½	34x4*	34x5*	D
Autocar, 27H	2	2950	4 x5½	34x5	36x7	D
Autocar, 27K2	2	3075	4 x5½	34x5	36x7*	D
Autocar, 26Y	5	3950	4¼x5½	34x6	36x12	D
Autocar, 26-B	5	4100	4¼x5½	34x6	36x12	D
Available, H1½	1½	2475	4 x5⅛	36x3½*	36x5*	W
Available, H2	2	2775	4 x5⅛	36x3½*	36x6*	W
Available, H2½	2½	3160	4 x5⅛	36x4*	36x8*	W
Available, H3½	3½	4175	4½x5½	36x5	40x5d	W
Available, H5	5	5375	4¾x6	36x6	40x12	W
Avery	1	....	3 x4	34x5†	34x5†	I
Beck, A Jr.	1	1950	3¾x5	34x3½	34x4	I
Beck, C	2	2550	4½x5½	36x4	36x6	I
Bell	½	1000	3½x5	31x4§	31x4	B
Bell, M	1	1495	3⅝x5½	35x5	35x5†	W
Bell, E	1½	2100	3¾x5¼	34x3½	34x5	I
Bell, O	2½	2550	4½x5½	34x4	34x6	I
Belmont, A	½	725	3¾x4¼	31x4	31x4	B
Belmont, D	2	2575	4½x5½	34x3½*	34x6*	I
Belmont, F	3	3500	4 x6	36x5*	36x5d*	I
Bessemer, G	1	1395	3½x5	35x5†	35x5†	I
Bessemer, H-2	1½	1995	3¾x5	36x3½	36x5	I
Bessemer, J-2	2½	2595	4½x5¼	36x4	36x4d	I
Bessemer, K-2	4	3495	4½x5½	36x5	36x10	I
Big 4, H	3½-4	5000	4½x6	36x6	36x6	W
Big 4, T	4	5500	4¾x6	36x6	36x6	W
Big 4, K	7	6000	5½x6	36x6	36x6	W
Big 4, HA	7	6000	4½x6	36x6	36x10	W
Brinton, C	1½	1500	3¾x5	34x4	34x5	W
Brinton, D	2½	2250	4⅝x5¼	36x4	36x7	W
Brockway, E	1	....	3¾x5⅛	35x5†	35x5†	B
Brockway, S-5	1½	....	3¾x5	36x3½*	36x5*	W
Brockway, SK	1½	....	4¼x5¼	36x4	36x6	
Brockway, KR	2½	....	4½x5½	36x4	36x8	
Brockway, K-5	2½	....	4½x5¼	36x4	36x8	W
Brockway, RT	3½	....	4¾x6	36x5	36x10	
Brockway, R-4	3½	....	4½x5½	36x5	36x5d	W
Brockway, T-4	5	....	4¾x6	36x6	40x6d	W
Capitol, G1½	1½	2975	3¾x5	35x5	38x7	W
Capitol, H2½	2½	3700	4¼x6	36x4	36x8	W
Capitol, K2½	2½	4250	4½x6	36x6	42x9	W
Capitol, M3½	3½	4425	4¾x6	36x5	36x10	W
Case	2	....	4¼x5¾	36x6	38x7	I
Champion Light Commercial	½	1150	3½x5	32x3½	32x3½	I
Chevrolet, G	¾	745	3½x4	31x4†	34x4½†	B
Chevrolet, T	1	1125	3½x5¼	33x4†	35x5†	W
Chicago, C1½	1½	....	3¾x5⅛	36x3½*	36x5*	W
Chicago, C2½	2½	....	4 x5½	36x4*	36x7*	W
Chicago, C3½	3½	....	4½x5½	36x5	36x10	W
Chicago, D5	5	....	4½x5½	36x6	40x12	W
Climber, A-20	1½	2450	3½x5	36x6*	38x7*	I
Clydesdale, 18	¾-1¼	1890	3¾x5	34x5	34x5	W
Clydesdale, 20	1-1½	2385	3¾x5½	34x3½*	34x5*	W
Clydesdale, 42	1½-2	2475	4 x5⅛	36x3½	36x5	W
Clydesdale, 65X	2½	3250	4¾x5½	36x4	36x7	W
Clydesdale, 65EX	2½-3	3450	4½x5½	36x4	36x7	W
Clydesdale, 90	3½-4	4100	4½x5½	36x5	40x10	W
Clydesdale, 120B	5-6	4500	4¾x6	36x6	40x12	W
Collier, 18	1	1850	3¾x5	34x4	34x5	W
Collier, 19	1½	1950	3¾x5	36x4	36x6	W
Collier, 21	2	2150	4½x5¼	36x4	36x7	W
Collier, 22	2½	2435	4½x5¼	36x4	36x4	W
Columbia, H	1½	1875	3¾x5	34x3½	34x5	I
Columbia, G	2½	2335	4 x5¼	36x4	36x7	I
Comet T	1½	1950	3¾x5	34x4	34x4	W
Commerce, T	¾-1¼	1450	3¾x5	34x4½†	34x4½†	B
Commerce, 12	1½	1800	3¾x5	35x5†	35x5†	I
Commerce, 16	2	2150	3¾x5	35x5†	35x6†	I
Commerce, 18	2½	$2495	4⅛x5¼	36x6†	36x7†	I
Concord, A	2	3150	4 x5½	36x3½	36x6	W
Concord, B	3	3600	4¼x5½	36x4	36x8	W
Concord, AX	2	3250	4 x5½	36x3½	36x6	W
Concord, BX	3	3600	4½x5½	36x4	36x8	W
Cook, 51	2½	3600	4 x5⅛	36x6†	40x8†	I
Corbitt, E-22	1	1480	3¾x5	34x3½	34x4	W
Corbitt, D-22	1½	2200	3¾x5	34x3½	34x4	W
Corbitt, C-22	2	2600	4¼x5¼	36x3½	36x6	W
Corbitt, B-22	2½	3000	4½x5¼	36x4	36x7	W
Corbitt, R-22	3	3200	4½x5½	36x4	36x8	W
Corbitt, A-22	3½-4	3800	4½x5½	36x5	36x10	W
Corbitt, AA-22	5	4500	4¾x6	36x6	40x6d	W
Day-Elder, AS	1	1600	3¾x5	35x5†	35x5†	W
Day-Elder, B	1½	2000	3¾x5	34x3½	34x5	W
Day-Elder, D	2	2400	4¼x5¼	36x4	36x7	W
Day-Elder, C	2½	2750	4¼x5½	36x4	36x7	W
Day-Elder, F	3½	3150	4½x5½	36x5	36x5d	W
Day-Elder, E	5	4250	4½x6	36x5*	40x6d*	W
Dearborn, E	1	1600	3⅝x5¼	35x5	35x5	W
Dearborn, FX	1½	2300	3¾x5⅛	34x4	34x5	W
Dearborn, F	1½	2180	3¾x5⅛	34x4	34x5	W
Dearborn, 48	2	2590	3¾x5⅛	34x4½	34x7	W
Defiance, G	1	1695§	3¾x5	35x5†	35x5†	B
Defiance, D	1½	2095§	3¾x5	35x5†	36x6†	I
Defiance, E	2	2275§	3¾x5	35x5†	38x7†	I
DeMartini, 1½	1½	2000	3¾x5	34x3½	34x6	W
DeMartini, 2	2	3300	4 x5½	36x3½	36x7	W
DeMartini 3	3	4250	4¼x5½	36x4	36x10	W
DeMartini 4	4	4800	4½x6	36x5	36x12	W
Denby, 31	1¼	1485	3½x5	35x5†	35x5†	B
Denby, 33	1½	2145	3¾x5	35x5†	38x7†	I
Denby, 34	2	2395	3¾x5	36x3½	36x6	I
Denby, 35	2½-3	2795	4¼x5¼	36x4	36x7	I
Denby, 27	4	3895	4½x5½	36x5	36x5d	I
Denby, 210	5	4295	4½x5½	36x6	40x6d	I
Dependable, A	¾-1	1650	3⅝x5⅛	34x5	36x6	W
Dependable, C	2	2350	3¾x5¼	34x3½	34x5	W
Dependable, D	2½	2650	4 x5½	34x5	36x6	W
Dependable, E	3	2950	4¼x5½	36x4	36x7	W
Diamond T, O- 3	1-1¼	1975	3¾x5¼	36x3½†	36x4†	W
Diamond T, FS	1½	2525	3¾x5¼	36x3½	36x5	W
Diamond T, T	1½	2250	3¾x5¼	36x3½	36x5	W
Diamond T, U	2	2650	4 x5½	36x4	36x7	W
Diamond T, K	3½	3750	4¼x5½	36x5	36x5d	W
Diamond T, EL	5	4325	4½x5½	36x6	40x6d	W
Diamond T, S	5	4500	4¾x6	36x6	40x6d	W
Diehl, A	1	....	3½x5	34x4½	35x5	I
Diehl, B	1½	....	3½x5	36x6	36x6	I
Dispatch, F	1	1350	3¾x5	34x4†	34x4†	I
Doane	2½	4100††	4¼x5¾	36x5	36x7	C
Doane	3½	5100††	4¾x5¾	36x5	36x5d	C
Doane	6	6000††	5 x6¼	36x6	40x6d	C
Dodge Brothers	½	730	3⅞x4½	32x4†	32x4†	B
Dorris, K-4	2-2½	3400	4¼x5½	36x4	36x7	W
Dorris, K-7	3½	4400	4¼x5½	36x5	36x10	W
Dort, 103	½	685	3½x5	31x4	31x4	B
Double Drive B	3	4000	4¼x5½	6	6	W
Duplex, A	1½-2	2775	4 x5¼	35x5†	38x7†	W
Duplex, E	3½	3500	4¼x5½	36x8	36x8	I
Duty, 22	2	1500	3½x5	34x3½	34x5	I
Eagle, 100-X	1½	....	3¾x5½	34x5	34x5	I
Eagle, 100-2	2	2275	3¾x5¼	34x4*	34x7*	I
Erie, E	1½	2185	3¾x5¼	36x6†	36x6†	W
Erie, A	2½	2985	4¼x5½	36x4	36x4d	W
F.W.D., B	3	4200	4¾x5½	36x6	36x6	B
Facto, 1921	2½	2295‡	4¼x5½	36x4*	36x8*	W
Fageol, 1½	1½	3000	3¾x5¼	34x3½*	34x6*	W
Fageol, 2½	2½	3900	4¼x5¾	34x4	36x7	W
Fageol, 3½	3½	5000	4½x6¼	36x5*	40x5d*	W
Fageol, 5	5	5700	4½x6¼	36x6	40x6d	W
Fargo, R	2	1900	3¾x	36x4	36x6	I
Federal, SD	1½	1800	3¾x5	35x5†	36x6†	W
Federal, TE	1½	2175	4¼x5¼	36x3½	36x5	W
Federal, UE	2-2½	2425	4¼x5¼	36x4	36x7	W
Federal, WE	3½-4	3150	4½x5½	36x5	36x5d	W
Federal, X2	5-6	4500	4¾x6	36x6	40x6d	W
Ford, TT	1	430	3¾x4	30x3½†	32x4½†	W
Forschler, A	1	....	3½x5	34x3	34x4	W
Forschler, AX	1½	....	3½x5	36x3½	36x5	W
Forschler, B	2	....	4¼x5¼	36x4	36x7	W
Forschler, BX	3	....	4½x5¼	36x4	36x8	W
Front Drive C	1½	2800	3¾x5½	5	4	W
G & J** 20	1	2275	3⅝x5⅛	34x5†	34x5†	W
G & J** A	2-2½	3375	4x5¼	36x4	36x7	W
G & J** B	3½-4	4475	4½x5½	36x5	36x5d	W
G.M.C., K16	1	1495	3½x5½	34x5†	34x5†	B
G.M.C., K41 A	2	2775	4 x5½	36x4*	36x7*	W
G.M.C., K71 A	3½	3950	4½x6	36x5	40x5d	W
G.M.C., K101A	5	4350	4½x6	36x5	40x6d	W
G.W.W.	1½	1950	3¾x5½	35x5	35x5	I
Garford, 15	¾	1590	3⅝x5⅛	34x5†	34x5†	W
Garford, 25	1 ¼	1990	3¾x5⅛	36x3½	36x4	W
Garford, 70-H	2	2750	4¼x5½	36x4	36x7	W
Garford, 77D	3½	3750	4½x6	36x5	36x6d	W
Garford, 68D	5	4500	5 x6½	36x6	40x6d	W
Garford, 150-A	7½	$5200	5x6½	36x6	40x7d	C
Gary, F	1½-1¾	2600	3¾x5	36x3½	36x4	W
Gary, I	2	2900	4 x5½	36x3½	36x5	W
Gary, J	2½	3800	4¼x5½	36x4	36x7	W
Gary, K	3½	4900	4½x6	36x5	40x5d	W
Gary, M	5	5900	5 x6½	36x6	40x6d	W
Gersix, M	1½	3100	4 x5½	36x3½	36x7	W
Gersix, K	2½	3500	4½x5½	36x4	36x8	W
Gersix	3½	4500	4½x6	36x5	40x12	W
Golden West, GH	3	4500	4½x6	36x7	36x7	W
Golden West, G	3½	5000	4½x5½	36x6	36x6	W
Graham Bros. 1-Ton	1	1265	37⅝x4½	33x4½	34x5†	B
Graham Bros. 1½-Ton	1½	1325	37⅝x4½	33x4½†	36x6†	B
1Gramm-Pion. 10	1	1365§	3½x5	33x5†	33x5†	F
1Gramm-Pion. 15	1½	1900§	3¾x5	36x3½*	36x5*	I
1Gramm-Pion. 65	1½	2500§	3¾x5	36x3½*	36x5	W
1Gramm-Pion. 20	2	2925§	4¼x5¼	36x4*	36x7*	W
1Gramm-Pion. 30	3	3275§	4¼x5½	36x4*	36x4d*	W
1Gramm-Pion.75-P	3½	4225§	4½x5½	36x6†	42x9†	W
1Gramm-Pion. 40	4	3995§	4½x5½	36x5	36x5d*	W
1Gramm-Pion. 50	5-6	4895§	4¾x6	36x6	40x6d*	W
Hahn, B2	1	1700	3¾x5	34x5*	34x5*	W
Hahn, O	1½	1900	4¼x5¼	36x3½*	36x6*	W
Hahn, K	2	2225	4½x5½	36x4*	36x8*	W
Hahn, L	3	2900	4½x5½	36x5*	36x10*	W
Hahn, M	5	3500	4¾x6	36x6	40x12	W
Hal-Fur, E	1½	2350	4 x5½	34x5†	38x7†	W
Hal-Fur, B	2½	3000	4¼x5½	35x5*	38x7*	W
Hal-Fur, F	3½	4000	4½x5½	36x6†	40x10†	W
Hall, 1½	1½	3100	3¾x5	34x5†	38x7†	W
Hall, 2½	2½	3275	4⅛x5¼	36x4	36x6	W
Hall, 3½	3½	4100	4½x5½	36x5	36x5d	W
Hall, 5	5	5100	4½x5½	36x5	40x6d	W
Hall, 7 chain	7	5100	4½x5½	36x5	40x6d	C
Harvey, WOA	2	2650	4¼x5½	34x4	34x7	W
Harvey, WFA	2½	2950	4¼x5½	36x4	36x7	W
Harvey, WHA	3½	3950	4½x6¼	36x5	36x5d	W
Hawkeye, K	1½	1850	3¾x5½	34x3½*	34x5*	I
Hawkeye, M	2	2650	4¼x5	36x4*	36x6*	I
Hawkeye, N	3½	3700	4½x6¾	36x5*	36x10*	I
Hendrickson, O	1½	2000	3¾x5¼	36x4†	36x5†	W
Hendrickson, N	2½	2690	4¼x5¾	36x4*	36x7*	W
Hendrickson, M	3½	3000	4¼x5	36x5*	36x5d*	W
Hendrickson, K	5	4000	5 x6¼	36x6	40x6	W
Huffman, B	1½	1995	3¾x5	34x3½	34x6	W
Huffman, C	1½	1795	3¾x5½	34x3½	34x6	I
Hurlburt A	1½	2850	4 x5½	34x4	34x5	W
Hurlburt B	2½	3750	4¼x5½	36x4	36x4d	W
Hurlburt C	3½	4590	4½x6	36x5	36x5d	W
Hurlburt D	5	5500	4½x6	36x5	40x6d	W
Indep'd't(Iowa), B	1	1665	3½x5	34x3½	34x4	I
Indep'd't(Iowa), G	1½	2040	3¾x5¼	34x3½	34x5	I
Indep'd't(Ia.), H.I	2½	2940	4¼x5¼	36x4	36x4	I
Indep d't(Ohio), F	1½	2385	3¾x5	36x3½	36x5	W
Indep'd't(Ohio), H	2½	3085	4¼x5¼	36x4	36x4d	W
Indep'd't(Ohio), K	3½	3985	4½x5½	36x5	36x5d	W
Indiana, 12	1½	....	3¾x5¼	34x3½*	34x5*	W
Indiana, 20	2	....	4¼x5½	36x4*	36x7*	W
Indiana, 25	2½	....	4¼x5½	36x4*	36x8*	W
Indiana, 35	3½	....	4⅜x5½	36x5*	36x5d*	W
Indiana, 51	5	....	5 x6¼	36x5*	40x6d*	W
Inland, D	2	2950	4 x5	34x5	34x6	I
International, S	¾	1500	3½x5	34x5†	34x5†	I
International, 21	1	1750	3½x5¼	36x3½	36x3½	I
International, 31	1½	1850	3½x5¼	36x3½	36x4	I
International, 41	2	2100	3½x5¼	36x3½	36x5	I
International, 61	3	2400	4¼x5	36x4	36x6	I
International, 101	5	3600	4¼x5	36x5	40x10	I
J & J, D	2	3250	4 x5	34x4*	34x6	I
Jackson, 4WD	3½	3850	4½x5½	36x7	30x7	B
Jumbo, 15	1½	2425	3¾x5¼	36x3½	36x5	I
Jumbo, 20	2	2675	3¾x5¼	35x5†	38x7†	I
Jumbo, 25	2½	3090	4½x5½	36x4	36x7	I
Jumbo, 30	3	3590	4¼x5½	36x6†	42x9†	I
Jumbo, 35	3½	4080	4½x6	36x5	36x10†	I
Jumbo, 40	4	4730	4½x6	38x7†	44x10	I
K-Z, 1	1	1750	3½x5	34x3½	34x5	W
K-Z, 1½	1½	2075	3¾x5	36x4	36x6	W
K-Z, 2½	2½	2550	4½x5¼	36x4	36x8	W
K-Z, 3½	3½	3350	4½x5½	36x5	40x10	W
K-Z, 5	5	3850	4½x5½	36x6	40x6d	W
Kalamazoo, G-1	1½	2495	3¾x5	34x4	34x5	W
Kalamazoo, G-2	1½	2800§	3¾x5	36x4	36x6	W
Kalamazoo, H	2½	3275§	4 x6	36x4	36x8	W
Kalamazoo, K	3½	4000§	4¼x6	36x5	36x10	W
Kalamazoo K-5	5	4500§	4½x6	36x6	38x6d	W
Karavan, A	2½	3750	4¼x6	36x4	36x8	W
Kearns, H	1	1150	3½x5	32x4½†	32x4½†	I
Kearns, N	2	1650	3½x5	34x3½	34x6	I
2Kelly-S., K-31	1½	2700	3¾x5¼	36x3½	36x6	C
2Kelly-S., K-34	1½	2700	3¾x5¼	36x3½	36x6	W
2Kelly-S., K-38	2½	2900	3¾x5¼	36x4	36x4d	W
2Kelly-S., K-35	2½	2900	3¾x5¼	36x4	36x4d	C
2Kelly-S., K-40	3½	3900	4½x6½	36x5	40x5d	C
2Kelly-S., K-41	3½	2900	4½x6½	36x5	40x5d	I
2Kelly-S., K-42	3½	3900	4½x6½	36x5	40x5d	W
2Kelly-S., K-50	5	....	4½x6½	36x6	40x6d	C
2Kelly-S., K-60	6	....	4½x6½	36x6	40x7d	C
Keystone, 40	2	2175	3¾x5½	34x5†	38x7†	I
Kimball, AB	2	3675	4 x6‖	36x4	36x7	W
Kimball, AC	2½	3975	4¼x6	36x4	36x8	W
Kimball, AK	3	4500	4½x6	36x4	36x10	W
Kimball, AE	4	5000	4¾x6	36x5	40x12	W

*2-cyl. †6-cyl. ‡8-cyl. All others, not marked, are 4-cyl. Trac., Tractor. **Canadian made.

Final Drive: W—Worm, I—Internal Gear, C—Chains, D—Double Reduction, B—Bevel, 4—Four-Wheel, E—External Gear. *Tires—optional. †Pneumatic Tires. All others solid. ††Price includes body. §—Price includes several items of equipment.

1—Gramm-Pioneer. 2—Kelly-Springfield.

Specifications of Current Motor Truck Models—Continued

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES Front	TIRES Rear	Final Drive
Kimball, AF	5	$5500	5 x6	36x6	40x7d	W
Kissel, Express	1	1985†‖	3⅞x5½	34x5†	34x5†	W
Kissel, Utility	1½	1975	3⅞x5½	36x3½	36x5	W
Kissel, Freighter	2½	2875	4¼x5½	36x4	36x7	W
Kissel, H. D.	4	3675	4¼x5½	36x5	36x5d	W
Kleiber, AA	1	2200	3½x5¼	34x3½*	34x5*	W
Kleiber, A	1½	3100	4½x5¼	36x3½*	36x6*	W
Kleiber, BB	2	3600	4½x5¼	36x4*	36x7*	W
Kleiber, B	2½	3950	4½x5½	36x5*	36x8	W
Kleiber, C	3½	4600	4½x5½	36x5	36x5d	W
Kleiber, D	5	5300	5 x6½	36x6	40x12	W
Koehler, D	1½	1995	3½x5	34x3½	34x5	W
Koehler, M	2½	3175	4 x5½	36x4	36x7	W
Koehler, MCS	2½	3275	4 x5½	36x4	36x7	W
Koehler, F	3½	4150	4½x5½	36x5	36x10	W
Koehler, MT, Trac	5	3275	4 x5⅛	36x4	36x7	W
Lange, B	2½	3350	4½x5¼	36x4*	36x7*	C
Larrabee, X-Z	1	1925	3¼x4½	34x5†	34x5†	B
Larrabee, U	1½	2400	3¼x5	34x3½	34x5	W
Larrabee, J	1½–2½	2400	3¾x5	34x3½*	34x5*	W
Larrabee, K	2½	3100	4¼x5½	36x4	36x7	W
Larrabee, K-5	2½–3	3450	4½x5½	36x4	36x8	W
Larrabee, L-4	3½	4000	4½x5½	36x5	36x5d	W
Larrabee, L-5	3½–5	4400	4¾x6	36x5	36x10	W
Larrabee, W	5	4800	4¼x6	36x6	40x6d	W
Luedinghaus, C	1	1690	3½x5	35x5†	35x5†	W
Luedinghaus, W	1½	2490	3¼x5¼	34x3½*	34x5*	W
Luedinghaus, K	2–2½	2790	4¼x5¼	36x4*	36x7*	W
Maccar, L	1½	2700	4⅛x5½	36x4	36x6	W
Maccar, H-A	2	3100	4½x5¼	36x4	36x4d	W
Maccar, H-2	3	3100	4½x5½	36x4	36x5d	W
Maccar, H-3	4	4200	4½x5½	36x5	36x6d	W
Maccar, G	5–6	4950	4¾x6	36x5	40x6d	W
MacDonald, A	7½	5750	4½x6	40x7	40x14	I
Mack, AB D.R.	1½	3150	4 x5	36x4	36x3½d	D
Mack, AB Chain	1½	3000	4 x5	36x4	36x3½d	C
Mack, AB Chain	2	3300	4 x5	36x4	36x4d	C
Mack, AB D.R.	2	3750	4 x5	36x4	36x4d	D
Mack, ABDR	2½	3850	4 x5	36x4	36x4d	D
Mack, AB	2½	3400	4 x5	36x4	36x4d	C
Mack, AC Chain	3½	4950	5 x6	36x5	40x5d	C
Mack, AC Chain	5	5500	5 x6	36x6	40x6d	C
Mack, AC Chain	6½	5750	5 x6	36x6	40x12	C
Mack, AC Chain	7½	6000	5 x6	36x7	40x7d	C
Mack Trac, AB	5	3400	4 x5	36x4	36x4d	C
Mack Trac., AC	7	4950	5 x6	36x5	40x5d	C
Mack Trac. AC	10	5500	5 x6	36x6	40x6d	C
Mack Trac., AC	13	5750	5 x6	36x6	40x12	C
Mack Trac., AC	15	6000	5 x6	36x7	40x7d	C
Mapleleaf, AA**	2	3775	4 x5¼	36x4	36x7	W
Mapleleaf, BB**	3	4350	4¼x5½	36x4	36x4d	W
Mapleleaf, CC**	4	5100	4½x5½	36x5	36x5d	W
Mapleleaf, DD**	5	6200	4½x5½	36x6	40x6d	W
Master, JW	1½	2290	3⅛x5½	34x3½	34x5	W
Master, JD	1½	2590	4½x5½	34x3½	34x5	D
Master, Z	2	2290	4½x5½	34x3½	34x5	W
Master, W	2½	2800	4¼x5½	34x4	36x7	D
Master, DD	2½	3190	4¼x5½	34x4	36x7	D
Master, A	3½	3990	4½x6	36x5	40x5d	W
Master, E	3½	4290	4½x6	36x5	40x5d	D
Master, Y	4	4490	4½x6	36x5	40x6d	D
Master, B	5	4990	4⅝x6½	36x6	40x6d	W
Master, F	5	5090	4⅝x6½	36x6	40x6d	D
Master Trac., DDT	6	3390	4¼x5½	34x4	36x7	D
Maxwell, 1½	1½	932	3⅝x4½	32x3	32x4	W
Menominee, HT	1–1¼	2000	3¾x5	34x3½	36x5	W
Menominee, H	1½	2175	4 x5	36x3½	36x5	W
Menominee, D	2–2½	2875	4 x6	36x4	36x8	W
Menominee, G	3½	3800	4½x6	36x5	36x10	W
Menominee, J-3	5	4850	4¾x6	36x6	40x12	W
Moline, 10	1½	1985	3½x5	34x5†	36x6†	I
[3]Moreland, R. R.	1	1595	4 x5	34x5†	34x5†	B
Moreland, BX	1½	1980	4 x5	36x3½	36x6*	W
Moreland, EX	2	2800	4⅛x5½	36x4	36x7*	W
Moreland, AX	3	3500	4½x5½	36x5	36x10*	W
Moreland, RX	4½–5	4600	4¾x6	36x6	40x6	W
Napoleon, 7	¾	1350	3½x5	38x4	33x4†	I
Napoleon, 9	1	1535	3½x5	35x5*	35x5*	I
Napoleon, 11	1½	1860	3½x5	35x5*	36x6*	I
Nash, 2018	1–1½	1595	3¾x5¼	35x5	36x6	I
Nash, 3018	2–2½	2150	3¾x5¼	36x6	40x8	I
Nash, Quad.	2–2½	2750	4¼x5½	40x8	40x8	I
Nash, 3018, LWB	2–2½	2200	3¾x5¾	36x6	40x8	I
Nash, Quad. LWB	2–2½	2800	4¼x5½	40x8	40x8	I
Nash, 5018	2½	2250	3⅜x5¼	34x4	34x6	I
[4]Nelson, F1½	1½	....	4⅛x5¼	36x3½	36x5	W
[4]Nelson, F2	2	....	4⅛x5¼	36x4	36x7	W
[4]Nelson, F3½	3½	....	4½x5½	36x5	36x5d	W
[4]Nelson, FC5	5	....	4¾x6	36x6	40x6d	W
Netco, DK	2	3100	4⅛x5¼	36x4*	36x7*	W
Netco, HL	2½	3500	4½x5½	36x4*	36x8*	W
New York, M	1½	....	4⅛x5¼	36x3½	36x5	W
New York, N	2–2½	....	4⅛x5¼	36x4	36x4d	W
Niles, E	2	3000	4⅛x5¼	36x4*	36x7*	W
Noble, B30	1½	....	3¾x5¼	36x3½	36x5	W
Noble, C40	2	....	4 x5½	36x4	36x7	W
Noble, D50	2½	....	4¼x5½	36x4	36x8	W
Noble, E70	3½	....	4½x6	36x5	36x10	W
Northway, B-2	2	3400	4 x6	36x4	36x4d	W
Northway, B-3	3½	4400	4 x6	36x5	40x5d	W
NorthwesternW	1½	2700	4⅛x5¼	34x4	36x6	W
Northwestern WS	2½	3500	4½x5½	36x4	36x8	W
Norwalk, 25E	1	1595	3½x5	34x3½	34x4	W
Norwalk, 35E	1½	1925	3½x5	34x3½	34x3½d	W
Norwalk.35E.Spec	1½	2285	3¾x5¼	34x3½	34x5	W
O. K., K1	1½	2450	4 x5½	36x3½	36x5	W
O. K., L1	2½	3250	4¼x5½	36x4	36x8	W
O. K., M1	3½	$4250	4½x6	36x5	36x5d	W
Ogden, D	½	....	3¾x5	36x3½	36x5	W
Ogden, D	1½	....	3¾x5	36x3½	36x5	W
Ogden, E	2½	....	4¼x5¼	36x4	36x8	W
Old Hickory, W	1	1775	3⅝x5	36x3½*	36x4*	W
Old Reliable, A	1½	2350	4 x5	34x4	36x6	W
Old Reliable, B	2½	3500	4½x6	34x4	36x4d	W
Old Reliable, C	3½	4250	4½x6	36x5	36x5d	W
Old Reliable, D	5	5250	4¾x6	36x6	40x6d	W
OldReliable,KLM	7	6000	4¾x6½	36x6	40x7d	C
Oldsmobile Econ.	1	1095	3½x5¼	35x5†	35x5†	I
Olympic, A	2½	3200	4¼x5½	36x4	36x8	W
Oshkosh, A	2	3750	3½x5	36x6†	36x6†	4
Oshkosh, AA	2	3850	3½x5	36x6†	36x6†	4
Oshkosh, B	2½	4150	4 x5⅛	38x7†	38x7†	4
Oshkosh, BB	2½	4300	4 x5⅛	38x7†	38x7†	4
Packard, EC	1½–3	3100	4½x5½	36x4	36x7	W
Packard, EX	1½–3	3100	4½x5½	36x6†	40x8†	W
Packard, ED	2–4½	4100	4½x5½	36x5	36x5d	W
Packard, EF	4–7½	4500	5 x5½	36x6	40x6d	W
Paige, 52-19	1½	1950	4 x5¼	34x3½	34x5	W
Paige, 51-20	2½	2420	4¼x5½	34x4	34x8	W
Paige, 51-18	3½	3145	4½x5½	36x5	36x5d	W
Parker, F20	2	3500	4 x6	34x4	36x4d	W
Parker, J20	3½	4400	4½x6	36x5	40x5d	W
Parker, M20	5	5500	4¾x6	36x6	40x6d	W
Patriot, Revere	1	1500	3⅜x5	35x5†	35x5†	W
Patriot, Lincoln	2	2050	4 5¼	34x3½	34x5	W
Patriot, Washgt'n	3	2900	4½x5½	36x4	36x7	W
Piedmont, 4-30	1	1200	3½x5	31x4†	34x4†	W
Pierce-Arrow	2	3200	4 x5½	36x4	36x4d	W
Pierce-Arrow	3½	4350	4½x6¾	36x5	36x5d	W
Pierce-Arrow	5	4850	4½x6¾	36x5	40x6d	W
Pioneer, 59	1	1550	3¾x4¼	32x4½†	32x4½†	W
Pittsburgher	1½–2	3000	3⅝x5	36x4	36x6	
Pittsburgher	3	3800	4½x5¼	36x5*	36x8	W
Power, F	2	3150	3¾x5¼	36x5	36x7	W
Power, C	3½	4250	4¼x5½	36x5	40x10	W
Premocar, B-143	1½	2475	3½x5	36x6†	36x6†	W
Rainier, R-21	¾	1990	3½x5	35x5†	35x5†	W
Rainier, R-19	1	2150	3½x5	31x3½	31x4	W
Rainier, R-16	1½	2490	3¾x5	34x3½	34x5	W
Rainier, R-18	2	2890	4½x5¼	34x4	34x6	W
Rainier, R-20	2½	3550	4½x5¼	34x4	31x7	W
Rainier, R-15	3½	4400	4½x5½	36x5	36x5d	W
Rainier, R-17	5	5100	4½x6	36x6	36x6d	W
Ranger, TK-22-2	2	2775	3¾x5	36x6†	38x7†	W
Reo, F	¾–1¼	1245	4½x4½	31x4½†	34x4½†	B
Reliance, 10A	1½	2400	4 x5½	36x3½	36x5	I
Reliance, 20B	2½	3100	4¼x5½	36x4	36x4d	I
Republic, 75	¾	1395†‖	3½x5	32x4½†	32x4½†	I
Republic, 10	1	1395	3¾x5	34x3	34x4	I
Republic, 10Exp.	1	1695	3¾x5	35x5†	34x5†	I
Republic, 11X	1½	1795	3¾x5	34x3½	34x6	I
Republic, 19	2½	2195	4½x5¼	36x4	36x7	I
Republic, 20	3½	3095	4½x5½	36x5	36x10	I
Rowe, CW	1½	3000	3¾x5	36x6†	36x6†	W
Rowe, C. D. W.	2	3300	4 x5	31x4	36x3½d	W
Rowe, G. S. W.	3	4150	4 x6	31x5	36x5d	W
Rowe, G. P. W.	3	5250	3¼x5†	38x7†	42x9†	W
Rowe, HW	4	4500	4¼x6	36x5	36x6d	W
Rowe, F. W.	5	5500	4½x6	36x6	40x6d	W
Ruggles, 20	1	1195	3¾x5	34x5†	34x5†	B
Ruggles, 40	2	1795	4 x5	34x5†	34x7	D
Sandow, G	1	2295	3¾x5	31x3½	34x5	W
Sandow, CG	1½	2590	3¾x5	31x4	34x6	W
Sandow, J	2½	3275	4½x5¼	36x4	36x7	W
Sandow, M	3½	4295	4½x5½	36x5	36x5d	W
Sandow, L	5	4975	4½x5½	36x6	40x6d	W
Sanford, 25	2½	....	4½x5¼	36x4	36x4d	W
Sanford, 35	3½	....	4½x5½	36x5	36x5d	W
Sanford, 50	5	....	4¾x6	36x5	40x6d	W
Schacht, 2-Ton	2	3200	4¼x5½	36x4	36x7	W
Schacht, 3-Ton	3	3800	4¼x5½	36x5	36x5d	W
Schacht, 4-Ton	4	4200	4½x6	36x5	40x5d	W
Schacht, 5-Ton	5	4400	4½x6	36x5	40x6d	W
Schacht, 7-Ton	7	5000	4½x6	36x6	40x7d	W
Schwartz, A	1	1695	3½x5	33x4½†	33x4½†	B
Schwartz, BW	1½	2690	3¾x5¼	31x3½*	34x7*	W
Schwartz, C.W.S.	2½	3200	4¼x5½	36x4	36x8	W
Schwartz, DW	5	4900	4½x6	36x6	40x12	W
Selden, 30	1½	2250	3¾x5	31x3½	34x5	W
Selden, 31	1½–2½	3350	4½x5¼	34x5	38x7	W
Selden, 50	2½	3250	4½x5¼	36x4	36x7	W
Selden, 51	2½–3½	4350	4½x5½	36x6†	40x8†	W
Selden, 70	3½–5	3750	4½x5½	36x5	36x10	W
Selden, 90	5–7	4950	4¾x6	36x6	40x12	W
Seneca, M	½	920	3½x4½	30x3½†	30x3½†	B
Service, 12	¾	....	3¼x4½	32x4½†	32x4½†	B
Service, 15	1¼	....	3¾x5	31x4½†	35x5†	B
Service, 220	1½	....	3½x5½	34x3½	34x5	W
Service, 31	2	....	4 x5½	36x3½	36x6	W
Service, 36	2	....	4¼x5½	35x5†	38x7†	W
Service, 51	2½	....	4¼x5½	36x4	36x7	W
Service, 71	3½	....	4¼x5½	36x5	36x5d	W
Service, 76	3½	....	4½x6	36x5	36x5d	W
Service, 101	5	....	4½x6	36x6	40x6d	W
Signal, NF	1	1950	4¾x5	34x5†	36x6†	W
Signal, H	1½	2450	4½x5¼	34x4	36x6	W
Signal, J	2½	$2875	4½x5¼	34x4	36x8	W
Signal, M	3½	3675	4½x5½	36x5	40x5d	W
Signal, R	5	4400	4¾x6	36x6	40x6d	W
Southern, 10	1	2090	3¾x5	34x3½	34x4	W
Southern, 15	1½	2590	3¾x5½	36x6†	34x4	W
Southern, 20	2	2990	4¾x5¼	36x6†	40x8*	W
Standard, 1–K	1½	1600	3¾x5	34x3½*	34x5*	W
Standard, 76	2½–3	2400	4½x5¼	36x4*	36x7*	W
Standard, 66	3½–5	3150	4½x5½	36x5	36x10	W
Standard, 5–K	5–7	4400	4¾x6	36x6	40x12	W
Sterling, 1½	1½	2885	4 x5¾	36x3½	36x5*	W
Sterling, 2	2	3085	4 x5¾	36x4	36x6*	W
Sterling, 2½	2½	3290	4¾x5¾	36x4*	36x4d*	W
Sterling, 3½	3½	4325	4½x6¼	36x5*	40x5d*	W
Sterling, 5–W	5	4950	5 x6¼	36x6*	40x6d*	W
Sterling, 5–C	5	5500	5 x6¼	36x6	40x6d	C
Sterling, 7½	7½	6000	5 x6¼	36x6	40x7d	C
Stewart, 14	¾	1195	3⅝x5½	32x4½†	32x4½†	I
Stewart, 15	1	1395	3⅝x5⅛	35x5†	35x5†	I
Stewart, 9	1½	1790	3¾x5	34x3½	34x5	I
Stewart, 7	2	2090	4¼x5¼	34x4	34x7	I
Stewart, 7–X	2½	2290	4¼x5½	34x4	34x7	I
Stewart, 10	3½	3090	4½x5½	36x5	36x5d	I
Stewart, 10–X	3½	3850	4½x6	36x5	36x5d	I
Stoughton, C	¾	1240	3½x5	34x4½†	34x4½†	W
Stoughton, F	1	1790	3⅜x5¼	34x4½†	35x5†	W
Stoughton, B	1½	2150	3¾x5¼	36x3½	36x5	W
Stoughton, D	2	2490	4 x5⅛	36x4	36x7	W
Stoughton, E	3	3150	4¼x5½	36x5d	36x5d	W
Sullivan, E	2	2800	4¼x5½	36x4*	36x7*	W
Sullivan, H	3½	3750	4½x6	36x5	36x5d	W
Superior, D	1	1650	3¾x5	34x4½†	34x4	I
Superior, E	2	2600	4¼x5¼	36x4	36x6	I
Super Truck, 50	2½	3300	4 x6	36x4	36x8	W
Super Truck, 70	3½	4300	4¼x6	36x5	40x5d	W
Super Truck, 100	5	5300	4¾x6	36x5	40x12	W
Super Truck, 150	7½	6300	5 x6	36x6	40x7d	W
Texan, A38	¾	1095	3½x5	33x4	33x4	I
Texan, TK39	1½	1550	3½x5	36x6	38x7	W
ThermartSpeedT'k	1¼	1795	4 x5¼	34x5	34x5	B
Tiffin, GW	1½	2100	4½x5¼	36x3½	36x5	W
Tiffin, MW	2½	2700	4½x5¼	36x4	36x3½d	W
Tiffin, PW	3½	3600	4½x5½	36x5	40x5d	W
Tiffin, F50	5	4300	4¾x6	36x6	40x6d	W
Tiffin, F60	6	4500	4¾x6	36x6	40x12	W
Titan	2	2950	4x5½	34x4*	36x7	I
Titan	3½	3950	4¼x5¾	36x5	40x10	I
Titan, 6–Ton	5	4550	4½x6	36x5	40x6d	I
Titan, 6–Ton	6	5150	4½x6	36x5	40x12	I
Tower, J	1½	2900	4½x5¼	35x5	38x7	W
Tower, H	2½	3200	4½x5¼	36x4	36x7	W
Tower, G	3½	4100	4½x5½	36x5	36x5d	W
Traffic, C	....	1595	3¾x5	34x3½*	34x5*	I
Traffic	3	1895	3¾x5	36x4	36x7	I
Transport, 20	1	1395	3¾x5⅛	34x3½	34x4	I
Transport, 30	1½	1995	3¾x5	36x3½	36x5	I
Transport, 50	2½	2785	4¼x5½	36x4	36x7	I
Transport, 70	3½	3885	4½x6	36x5	36x10	I
Traylor, B	1½	2390	3⅜x5⅛	34x3½	34x5	W
Traylor, C	2	2850	4 x5½	36x4	36x7	W
Traylor, D	3	3300	4¼x5½	36x4	36x8*	W
Traylor, E	4	4450	4½x6	35x5	40x10	W
Traylor, F	5	4700	4½x6	36x6	40x6d	W
Triangle, AA	¾–1	1385	3¼x5	34x4½†	34x4½†	I
Triangle, A	1½	2350	3¾x5¼	34x3½	34x6*	I
Triangle, C	2	2700	3¾x5¼	36x4*	36x6*	I
Triangle, B	2½	2950	4 x5¾	36x4*	36x7*	I
Triumph, G	1	1995	3⅝x5⅛	34x5†	34x5†	W
Triumph, HC	1½	2550	3¾x5¼	36x3½	36x5	W
Triumph, HB	2	2900	3¾x5¼	36x4	36x7	W
Twin City, B.W.	2	2750	4 x5½	36x4	36x7	I
Twin City, A.W.	3½	3950	4½x6	36x5	40x5d	W
[5]Twin City, B	3½	....	5½x6	36x6	36x6	I
[5]Twin City, A	5	....	5½x6	36x7	36x7	I
Ultimate, A	2	3200	4 x5½	36x3½	36x6	W
Ultimate, AJ	2	3250	4¼x5½	36x3½	36x6	W
Ultimate, AJL	2	3300	4¼x5½	36x3½	36x6	W
Ultimate, B	3	3750	4¼x5½	36x4	36x4d	W
Ultimate, BL	3	3850	4¼x5½	36x4	36x4d	W
Ultimate, D	5	5500	5 x6½	36x6	40x12	W
Union, FW	2½	3190	4 x6	36x5*	36x8*	D
Union, HW	4	4485	4½x6	36x6	40x12	D
Union, JW	6	5800	5 x6	36x6	40x14	D
United, A	1½	2445	3¾x5¼	36x3½*	31x5*	I
United, B	2½	3150	4¼x5½	36x4*	36x7*	I
United, C	3½	3975	4¼x5½	36x5	36x5d	I
United, V	5	4500	4½x6	36x6	40x6d	I
United States, U	1	1875	3⅝x5⅛	34x5†	34x5†	B
United States,NW	1½	2225	3¾x5	36x5	36x3½	W
United States, N	1½	1975	3¾x5	36x3½*	36x5*	I
United States, R	3	3075	4 x5¼	36x4	36x4d	W
United States, S	4	3875	4½x5½	36x5	36x5d	W
United States, T	6	4850	4¾x6½	36x6	40x6d	W
Velie, 46	1½	1585	3¾x5	36x3½	36x5	I
Veteran, M**	1½	2699	3¾x5¼	35x5†	35x5†	W
Veteran, P**	2	3699	4¼x5½	36x4	36x7	W
Veteran, R**	3	4200	4¼x5½	36x4	36x7	W
Veteran, S**	4	5395	4¼x6	36x5	36x10	W
Vim, 29	½	1050	3½x4½	31x4†	31x4†	W
Vim, 30	½	1175	3½x4½	32x4½	32x4½	W
Vim, 31	1	1975	3¾x5½	35x5†	35x5†	W
Vim, 22	2	3150	3¾x5½	36x4	36x6	W
Vim, 23	3	3950	4¼x5½	36x5	36x5d	W
Vulcan, 25	2½	4000	4¼x6	36x4	38x8	W
Vulcan, 25P	3	4500	4¼x6	36x6	40x8	W
Walker-JohnsonA	2	2500	3¾x5	34x5	38x7	W
Walker-Johnson,B	3	3500	4¼x5½	36x4	36x8	W

*2-cyl †6-cyl. ‡8-cyl. All others, not marked, are 4-cyl. Trac., Tractor. **Canadian made.

Final Drive: W—Worm, I—Internal Gear, C—Chains, D—Double Reduction, B—Bevel, 4—Four-Wheel, E—External Gear. *Tires—optional. †Pneumatic Tires. All others solid. ††Price includes body. §—Price includes several items of equipment.

3—Moreland Road Runner. 4—Nelson Le Moon. 5—Twin City Four Wheel Drive.

Specifications of Current Motor Truck Models—Continued

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES Front	TIRES Rear	Final Drive
Walter, S	5	$4850	4½x6¼	36x6	40x6d	W
Ward-LaF., 2B	2½	2990	4⅜x5¾	36x4	36x4d	W
Ward-LaF., 4A	3½	3990	4½x6¼	36x5	36x5d	W
Ward-LaF., 5A	5	4590	5 x6¼	36x6	40x6d	W
Watson, B	1	1685	3¾x5¼	35x5†	35x5†	W
Watson, N	3½	3825	4½x5½	36x5	36x10	W
Western, W1½	1½	2550	4⅜x5¼	36x3½*	36x5*	W
Western, L1½	1½	2550	3¾x5	36x3½*	36x5*	W
Western, W2½	2½	3250	4⅜x5¼	36x4	36x7	W
Western, L2½	2½	3250	4¼x6	36x4	36x7	W
Western, W3½	3½	4250	4½x6	36x5	40x5d	W
White, 15	¾	2400	3¾x5¼	34x5†	34x5†	B
White, 20	2	3250	3¾x5½	36x4*	36x7	D
White, 40	3½	4200	3¾x5¾	36x5	40x5d	D
White, 45	5	4500	4¼x5¾	36x6	40x6d	D
White Hick., E	1	1225	3¾x5	34x5†	34x5†	W
White Hick., H	1½	1375	3¾x5	36x3½	36x5	W
White Hick., K	2½	1675	4¼x5¼	36x4	36x5	W
Wichita, K	1	1875	3¾x5¼	36x3*	36x4*	W
Wichita, M	2	2400	3¾x5¼	36x3½*	36x6*	W
Wichita, RX	3	$3200	4⅜x5¾	36x4*	36x8*	W
Wichita, O	4	3500	4½x6¼	36x5*	36x5d*	W
Wilcox, AA	1	1900	3¾x5½	36x4*	36x4*	W
Wilcox, BB	1½	2550	4¼x5	36x4	36x5	W
Wilcox, D	2½	3000	4¼x5	36x4*	30x3½d*	W
Wilcox, E	3½	3950	4½x6	36x5*	36x5d*	W
Wilcox, F	5	4350	4¾x6½	36x5	40x6d	W
Wilson, F	1½	2270	3¼x5	36x3½	36x5	W
Wilson, EA	2½	2825	4⅛x5¼	36x4	36x7	W
Wilson, G	3½	3885	4½x5½	36x5	36x5	W
Wilson, H	5	4520	4¾x6	36x6	40x6	W
Winther, 751	1½	1795	3¼x5	31x4½†	35x5	I
Winther, 430	1½	2850	3¾x5	32x4	32x4	I
Winther, 39	1½	$2450	3¾x5	34x3½	34x5	I
Winther, 49	2	3250	4¼x5	34x4	34x4b	I
Winther, 50	2½	3995	4¼x6	38x7†	42x††	I
Winther, 70	3½	4 00	4 x6	36x5	36x5b	I
Winther, 450	2½	3690	4 x5	34x5	36x6	I
Winther, 109	5	5250	4½x6	36x6	40x5b	I
Winther, 140	7	5900	5 x6	36x6	40x7b	I
Wisconsin, A	1	1750	3¾x5	34x5†	34x5†	W,B
Wisconsin, B	1½	2100	3¾x5	35x5	36x6	W
Wisconsin, C	2½	2700	4 x5¼	36x6†	36x7	W
Wisconsin, D	3½	3000	4⅜x5¾	36x6†	40x8	W
Wisconsin, E	5	3500	4½x6¼	36x6	36x10	W
Wisconsin, F	7	4000	5 x6¼	36x6	36x12	W
Witt-Will, N	1½	2250	3¾x5	36x3½*	36x5*	W
Witt-Will, P	2½	2750	4⅛x5¼	36x3½*	36x7*	W
Wolverine, J	1	2125	3½x5	34x3	34x4	I
Wolverine, J	1½	2375	3¾x5	34x3½	34x5	I
Wolverine, J	2	2640	3¾x5	34x4	34x7	I
Wolverine, J	2½	3425	4⅛x5¼	36x5	36x10	I
Wolverine, L	3½	4100	4½x5½	36x5	36x10	I

*2-cyl. †6-cyl. ‡8-cyl. All others, not marked, are 4-cyl. Trac., Tractor. **Canadian made.

Final Drive: W—Worm, I—Internal Gear, C—Chains, D—Double Reduction, B—Bevel, 4—Four-Wheel, E—External Gear. *Tires—optional. †Pneumatic Tires. All others solid. ††Price includes body. §—Price includes several items of equipment.

Farm Tractor Specifications and Prices

TRADE NAME	Rating	Price	Wheels or Crawlers	Engine	Cylinders: Bore, Stroke	Fuel	Plow Capacity
All-In One	15-30	$1975	3	Weid.	4-4 x5½	GDK	2-3
Allis-Chalm..B	6-12	....	2	LeR.	4-3½x4½	Gas.	1
Allis-Chal.G.P	15-25	1350	2	Midw.	4-4½x5¼	Gas.	3
Allis-Chalm.	20-35	1885	4	Own	4-4¾x6½	GorK	3-4
Allis-Chalm.	20-35	2085	4	Own	4-4¾x6½	G,K	4
Allwork...2-G	14-28	1695	4	Own	4-4¾x6	GorK	3
Allwork.....C	14-28	1395	4	Own	4-5 x6	GorK	3
AndrewsKin.D	18-36	2500	4	Clim.	4-5 x6½	GorK	4
Appleton	12-20	1500	4	Buda	4-4¼x5½	G,K	2-3
ARO..1921-22	3-5	385	4	Own	1-4½x5	Gas.	1
Aultman-T.	15-30	2200	4	Clim.	4-5 x6½	G,K	4
Aultman-T.	22-45	3420	4	Own	4-5½x8	G,K	6
Aultman-T.	30-60	4500	4	Own	4-7 x9	G,K,D	8-10
Automot. B-3	12-24	1785	4	Herc.	4-4 x5½	Gas.	2-3
Avery,SR.Cul	5-10	....	4	Own	4-3 x4	G,K	..
Avery..Cult-C	....	....	3	Own	6-3 x4	G,K	..
Avery.....B	5-10	....	4	Own	4-3 x4	G,K	2
Avery.....C	....	....	4	Own	6-3 x4	G,K	..
Avery.....	8-16	....	4	Own	2-5½x6	G,K,D	2-3
Avery.....	12-20	....	4	Own	4-4½x6	G,K,D	3-4
Avery.....	....	....	*	Own	4-4x5½	G,K,D	3
Avery.....	12-25	....	4	Own	2-6½x7	G,K,D	3-4
Avery.....	14-28	....	4	Own	4-4½	G,K,D	3-4
Avery.....	18-36	....	4	Own	4-5½x6	G,K,D	4-5
Avery.....	25-50	....	4	Own	4-6½x7	G,K,D	5-6
Avery.....	45-65	....	4	Own	4-7¾x8	G,K,D	8-10
Bates.....	15-25	....	4	Own	4-4¼x6	Ker.	3
Bates Mule..H	15-25	....	4	Midw	4-4½x5¼	Gas.	3
Bates Mule,..F	18-25	....	*2	Midw	4-4½x5¼	Gas.	3
Bates Mule,.G	25-35	....	*2	Midw	4-4½x6	Gas.	..
Beeman,....G	2-4	240	4	Own	1-3½x4½	Gas.	....
Best.....	18-30	3100	*2	Own	4-4¾x6½	G,K,D	4
Best.....	60	5450	*2	Own	4-6½x8½	G,K,D	8-9
Boring...1921	.....	1850	3	Wauk	4-4⅜x5¾	GorK	2
Burn-Oil, 1922	15-30	1435	4	Own	2-6½x7	Ker.	3-4
Capital.....	15-30	1000	2	Own	4-4¼x6	Gas.	3
Case.....	10-18	700	4	Own	4-3½x5	GorK	2
Case.....	15-27	1320	4	Own	4-4½x6	GorK	3-4
Case.....	22-40	2550	4	Own	4-5½x6¾	GorK	4-5
Case....40-72	40-72	....	4	Own	7 x8	G,K,D	8-10
Caterpillar T11	25	3975	*2	Own	4-4¾x6	Gas.	4
Caterpillar T16	40	6050	*2	Own	4-6½x7	Gas.	6
Centaur.....	5-2½	385	2	N Way	2-4½x4½	GorK	1
Chase.....	12-25	1725	3	Buda	4-4½x5½	GorK	2-3
Chicago....40	40	2500	4	Own	4-4½x6	Gas.	4
Cletrac.....F	9-16	595	*2	Own	4-3¼x4½	G,K,D	2
Cletrac.....W	12-20	1315	*2	Own	4-4 x6½	G,K,D	2-3
Dakota.....4	15-27	1500	3	Dom.	4-4¾x6	Gas.	3
Dart.....B.J.	15-30	1800	4	Buda	4-4½x6	Gas.	3-4
Depue.....A	20-30	2500	4	Buda	4-4½x6	Gas.	4
Dill.....D	20	2380	4	Cont.	4-4½x5½	Gas.	3
Dill.....R.W.	20	2980	4	Midw.	4-4½x6	Gas.	3
Do-It-All....A	3-6	595	..	Own	1-4½x5	Gas.	1
Eagle.....F	12-22	....	4	Own	2-7 x8	GorK	3-4
Eagle.....F	16-30	....	4	Own	2-8 x8	GorK	4-5
E-B. AA	12-20	1095	4	Own	4-4¾x5	G,K,D	3
E-B.....Q	12-20	750	4	Own	4-4¾x5	G,K,D	3
E-B.....	16-32	1750	4	Own	4-5½x7	G,K,D	4
Evans.....	18-30	2000	4	Buda	4-4½x6	G,K	3
Fageol.....D	9-18	1525	4	Lyc.	4-3½x5	Gas.	2
Farm Horse..B	18-30	1885	4	Clim.	4-5 x6½	G,K	4
Farquhar.....	15-25	....	4	Buda	4-4½x6	G,K,D	3-4
Farquhar.....	18-35	....	4	Own	4-6 x8	G,K,D	4-5
Farquhar.....	25-50	....	4	Own	4-7 x8	G,K,D	6-7
Fitch.....4	20-35	....	4	Clim.	4-5 x6½	GorK	3-4
Flour City....	20-35	....	4	Own	4-5¼x6	Ker.	4-6
Flour City....	30-50	....	4	Own	4-6¾x7	Ker.	6-8
Flour City....	40-70	....	4	Own	4-7½x9	Ker.	8-10
Fordson.....	-18	395	4	Own	4-4x5	G,K	2
Fox.....E	20-40	2390	4	Own	4-5½x7½	G or K	4
Franklin....G	18-30	4000	*2	Clim.	4-5 x6½	G or K	3-4
Franklin....C	18-30	3350	*2	Clim.	4-5 x6½	G or K	3-4
Franklin...G2	18-30	4350	2	Clim.	4-5 x6½	G or K	3-4
Frick.....A	12-20	....	4	Erd.	4-4 x6	G,K	2-3
Frick.....C	15-28	....	4	Beav.	4-4¾x6	G,K	3-4
Grain Belt...A	18-36	$2150	4	Wauk.	4-4¾x6¾	G or K	4
Gray.....1920	18-36	2000	3	Wauk	4-4¾x6¾	Gas.	4
Ground Hog..	19-31	2000	4	Erd.	4-4 x6	G or K	3
Gt. Western Si	20-30	1950	4	Beav.	4-4¾x6	K	4
Hart-Parr..20	20	945	4	Own	2-5¼x6½	K,D.	2
Hart-Parr..30	30	1295	4	Own	2-6½x7	K,D.	3
Heider.....D	9-16	870	4	Wauk	4-4¼x5¾	G,K	2
Heider.....C	12-20	900	4	Wauk	4-4½x6¾	G,K	3
Heider...Cult	5-10	800	4	LeR.	4-3½x4½	Gas.	1
Huber Light 4	12-25	1185	4	Wauk	4-4½x5¾	G or K	3
Huber Super 4	15-30	1885	4	Midw.	4-4½x6	Gas	3
Illinois, Super-Drive.....C	15-30	....	4	Clim.	4-5 x6½	G,K	4
Imperial...E	40-70	4500	4	Own	4-7½x9	G,K,D	10
Indiana.....F	5-10	665	2	LeR.	4-3½x4½	Gas.	1-2
International.	8-16	†670	4	Own	4-4¼x5	G,K,D	2
Internatl.Titan	10-20	†700	4	Own	4-5¼x8	G,K,D	4
International..	15-30	1500	2	Own	4-4½x6	G,K,D	3
J-T.....N	20-40	....	*2	Chief.	4-4¾x6	G,K,D	3-4
Klumb.....F	18-32	950	4	Clim.	4-5 x6½	....	..
Knudsen..1920	25-45	2000	4	Own	4-5½x9	Gas	4-6
LaCrosse...M	6-12	650	4	Own	2-4 x6	G,K	1
LaCrosse....G	12-24	985	4	Own	2-6 x7	G or K	3
Lauson.....5	12-25	1495	4	Midw.	4-4½x5¼	Gas.	3
Lauson.....20	15-25	1685	4	Beav.	4-4½x6	G or K	3-4
Lauson.....21	15-30	1985	4	Beav.	4-4¾x6	G or K	3-4
Lauson Read..	15-30	2225	4	Beav.	4-4¾x6	K	....
Leader.....B	12-18	685	4	Own	2-6 x6½	G,K,D	2-3
Leader.....M	16-32	1725	4	Clim.	4-5 x6½	G,K	3-4
Leader....GU	18-36	2150	*2	Clim.	4-5 x6½	G,K	3-4
Leonard....E	20-30	2530	4	Buda	4-4½x6	G,K	3
Linn.....H4J	40-	4500	*	Cont.	4-4½x5½	Gas	4
Linn.....W	60	5000	*	Wauk	4-5 x6¼	Gas	6
Little Giant..B	16-22	2200	4	Own	4-4½x5	K	4
Little Giant..A	26-35	3300	4	Own	4-5½x6	K	6
Lombard..1921	85-150	....	*2	....	6-5½x6¾	Gas.	16
Lombard..1921	50	....	*2	....	4-4¾x6½	....	6-10
Magnet.....B	14-28	1875	4	Wauk	4-4½x6¼	K&G	3
Master Jr.....	5-10	585		LeR.	-2⅜x4	Gas.	1
MerryGar1922	2	210	2	Evin	1-2⅝x2½	Gas.	..
Minne...All-P	12-25	900	4	Own	4-4½x7	G or K	3
Minne. Gen.P	17-30	1675	4	Own	4-4¾x7	G or K	3-4
Minne. Med.Duty	22-44	3000	4	Own	4-6 x7	G or K	5-6
Minne. HeavyDuty	35-70	4150	4	Own	4-7¼x9	G or K	8-9
Mohawk..1921	8-16	785	2	Light	4-3¼x4½	K or G	1-2
Moline Univ D	9-18	990	2	Own	4-3½x5	Gas.	2-3
Moline Orch..	9-18	990	2	Own	4-3½x5	Gas.	2-3
Motor Macult.	1½	195	2	Own	1-2¾x3½	Gas.	..
Motox.....	15-30	2250	4	Buda	4-4½x6	Gas.	3-4
NB.....1	3-6	425	4	Own	2-3¾x4	Gas.	1
Nichols-Shep. 20-42.	20-42	2650	4	Own	8 x10	G or K	3-6
Nichols Shep. 25-50	25-50	3000	4	Own	9 x12	G or K	4-7
Nilson Senior..	20-40	1975	5	Wauk	4-5 x6¼	G,K	4
Oil Pull.....K	12-20	1095	4	Own	2-6 x8	K,D	3
Oil Pull.....H	16-30	1750	4	Own	2-7 x8½	K,D	4
Oil Pull.....G	20-40	2550	4	Own	2-8 x10	K,D	5-6
Oil Pull.....E	30-60	3775	4	Own	2-10x12	K,D	8-10
Oldsmar GarK	2¼-5	225	4	Own	1-5½x5½	Gas.	1
Oliver.....A	15-30	....	*2	Beav.	4-4½x6	G or K	3-4
Once Over Tiller Mark..6	12-25	3000	4	Strns	4-4½x6	Gas.	2
Oshkosh....M	6-12	650	2	Own	2-4 x6	G,K	1
Oshkosh....G	12-24	985	2	Own	2-6 x7	G,K	3
Peoria.....L	12-25	1600	4	Clim.	4-5 x6½	G,K	3
Pioneer.....G	20-40	1750	4	Own	4-5½x6	G,K,D	4
Pioneer.....C	40-75	$3550	4	Own	4-7 x8	Gas.	10
Plowman....A	15-30	1295	4	Buda	4-4½x6	G,K	3-4
Ranger Cul. T-20	8-16	....	4	LeR.	4-3½x4½	Gas.	1
Reliable.....	10-20	685	4	Own	2-6 x7	Ker.	2
Rex.....	12-25	1600	4	Wauk	4-4¼x5¾	G or K	3
Russell.....	12-24	1500	4	Own	4-4¼x5¾	G or K	2-3
Russell.....	15-30	2200	4	Own	4-5 x6½	G or K	3-4
Russell.....	20-35	3000	4	Own	4-5½x7	G or K	4-5
Russell.....	30-60	5000	4	Own	4-8 x10	G or K	8-10
Samson...M	....	445	4	Own	4-4 x5½	G,K	2
Sandusky....J	10-20	1250	4	Own	4-4¼x5¼	G,K,D	2
Sandusky....E	15-35	1750	4	Own	4-5 x6½	G,K,D	4
Shelby.....D	15-30	....	4	Beav.	4-4¾x6	G,K	3
Shelby.....C	9-18	....	4	Wauk	4-3¾x5¾	G or K	2
Short Turn...	20-40	1500	3	Beav.	4-4¾x6	G,K	3
Steady Pull..	12-24	1485	4	Own	4-4 x5	Gas.	3
Stinson....4E	18-36	1835	4	Beav.	4-4¾x6	G,K	4
Tioga.....3	15-27	1985	4	Wisc.	4-4½x6	Gas.	3-4
Topp-Stewart...B	30-45	3500	4	Wauk	4-4¾x6¾	Gas.	3-4
Toro Cultivator	6	750	3	LeR.	4-3½x4½	Gas.	2
ToroTractor'22	6-10	495	3	LeR.	4-3½x4½	Gas.	2
Townsend.....	10-20	750	2	Own	4-6½x7	Ker.	2-3
Townsend.....	15-30	1350	2	Own	4-7 x8	Ker.	3-4
Townsend.....	25-50	2500	2	Own	4-8½x10	Ker.	4-8
Traction Motor	40-50	....	4	....	8-3¼x5	Gas.	4-5
Traylor....TB	6-12	715	4	LeR.	4-3½x4½	Gas.	1-2
Triumph....H	18-36	2450	2	Erd.	4-4¾x6	Ker.	4½
Trundaar....10	25-40	3750	*2	Wauk	4-5 x6¼	G or K	4
Turner...1921	14-25	1295	4	Buda	4-4¼x5½	G,K	3
Twin City....	12-20	1395	4	Own	4-4¼x6	G,K	3
Twin City....	20-35	2950	4	Own	4-5½x6¾	G,K	5
Twin City....	40-65	4750	4	Own	4-7¾x9	G,K	8
Uncle Sam C20	12-20	1385	4	Weid.	4-4 x5½	G	2-3
Uncle Sam B19	20-30	2300	4	Beav.	4-4¾x6	G or K	3-4
Uncle Sam D21	20-30	1985	4	Beav.	4-4¾x6	G or K	3-4
Universal.....	1-4	475	2	Own	1-3½x5	G	1
Utilitor....501	2½-4	295	4	Own	1-3½x4½	G	1
Vim.....B	15-30	1190	4	Wauk	4-4¾x5¾	G,K	3
Wallis.....K	15-25	†995	4	Own	4-4¼x5¾	G,K	3
Waterloo....N	12-25	675	4	Own	2-6½x7	G,K	3
Webfoot....53	28-53	5000	*2	Wisc.	4-5¾x7	G,D	6
Wellington...B	12-22	....	4	Erd	4-4 x6	Ker.	2-3
Wellington...F	16-30	....	4	Chief	4-4¾x6	Ker.	3-4
Western..1920	16-32	2100	4	Clim.	4-5 x6½	Gas.	4
Wetmore21-22	12-25	1185	4	Wauk	4-4 x5¾	G,K	3
Whitney.....D	9-18	595	4	Own	2-5½x6½	Gas.	2
Wichita.....T	15-30	2500	4	Beav.	4-4½x6	G,K,D	3-4
Wisconsin...E	16-30	1850	4	Clim.	4-5 x6½	G or K	3
Wisconsin...F	20-40	2050	4	Wauk	4-5 x6¼	G or K	4
Wisconsin,..H	22-40	2550	4	Clim.	4-5½x7	G or K	4-6
Yuba....12-20	12-20	2400	*2	Wisc.	4-4½x6¾	G,K,D	3
Yuba....15-25	15-25	2750	*2	Wisc.	4-4¼x6	G,K,D	..
Yuba....23-35	20-35	3900	*2	Wisc.	4-5¾x7	G,K,D	4
Yuba....25-40	25-40	4600	*2	Wisc.	4-5¾x7	G,K,D	..
Zelle.....	12-25	....	4	Buda	4-4¼x5½	G or K	3

ABBREVIATIONS: G—Gasoline. K—Kerosene. D—Distillate. Plow capacity varies in relation to operating conditions. Figures are based on 14 in. plows. Engine Make: Beav.—Beaver. Clim.—Climax. Cont.—Continental. Dom.—Domas. Evin.—Evinrude. Herc.—Hercules. LeR.—LeRoy. Midw.—Midwest. Nway.—New Way. Nor.—Northway. Strns.—Stearns. T.C.—Twin City. Wauk.—Waukesha. Weid.—Weidely. Wis—Wisconsin. *—Crawler type. All others are wheel type. †Price includes plows.

COMING MOTOR EVENTS

AUTOMOBILE SHOWS

Uniontown, Pa.	Automobile Show	Mar. 25-Apr. 1
Wash'ton, City of	Automobile Trade Assn	Mar. 25-Apr. 1
Oklahoma City	Automobile Show	Mar. 27-Apr. 1
Torrington, Conn.	Automobile Show	Mar. 27-Apr. 1
Ben. Harbor, Mich.	Michigan Automotive Trade Assn	Mar. 28-31
Quincy, Ill.	Automobile Show	Mar. 28-Apr. 1
Owensboro, Ky.	Automobile Show	Mar. 29-Apr. 1
E. Liverpool, O.	Automobile Show	Mar. 30-Apr. 7
Bridgeton, N. J.	Automobile Show	Apr. 1- 8
Bat. Creek, Mich.	Michigan Automotive Trade Assn	Apr. 2- 8
Canton, O.	Automobile Show	Apr. 3-8
Davenport, Ia.	Automobile Show	Apr. 3- 8
Murphysboro, Ill.	Automobile Show	Apr. 3-10
New York City.	Electric Automobile Show	Apr. 3-15
Holdredge, Neb.	Automobile Show	Apr. 5-8
Sioux Falls, S. D.	Automobile Show	Apr. 5-8
Marinette, Wis.	Automobile Show	Apr. 6-8
Asbury Pk., N. J.	Automobile Show	Apr. 10-15
Johnstown, Pa.	Automobile Show	Apr. 10-15
Wins.-Salem, N.C.	Automobile Show	Apr. 11-17
Columbia, S. C.	Automobile Show	Apr. 17-22
Goldsboro, N. C.	Automobile Show	Apr. 18-22
Mt. Vernon, Ill.	Automobile Show	Apr. 24-30
Chicago	Used Car Show	Apr. 26-May 4
Williamson, W. Va.	Automobile Show	May 10-13
Hartford, Conn.	Automobile Show	Sept. 4- 9

FOREIGN SHOWS

Mexico City	Automobile Show	Apr. 16-23
Rio de Janiero	Automotive Exhibition	Sept., 1922

CONVENTIONS

Colo. Spgs., Colo.	Automotive Equipment Assn.	June 9-24
White Sulphur Springs, W.Va.	S. A. E. Summer Meeting	June 20-24
Olympia	Washington Automotive Trade Assn.	July 21-22

RACES

Indianapolis	500-Mile Classic	May 30
San Carlos, Cal.	500-Mile Armistice Day Race	Nov. 11

Chrysler to Devote Full Time to Maxwell Company

Detroit, March 28—Walter P. Chrysler, former vice president of Willys-Overland, will devote all his efforts in the automobile field to his work as chairman of the board of the Maxwell Motor Corp. The use of his name in connection with a car to be brought out by the Cletrac interests in Cleveland, he said, was ill-advised, as he contemplated no connection with that company.

"We are going to make 250 Maxwells a day in April to meet the steadily growing demand for our product," he said.

Chalmers business in April will show a large increase over former months despite increased price, Chrysler said. There has been considerable business in March due to orders being placed to get in before the increase, he said, but April business already placed will show an increase over the March business.

Merchandising plans are being developed whereby the factory will be enabled to co-operate completely with the sales organization in the field, in developing Maxwell business. Under this plan, service will be a leading factor and genuine parts will be constantly available to all.

MEXICO CITY SHOW IN APRIL

Mexico City, March 27—Applications for space reservations for the automobile show which is to be held in the National Theater here April 16 to 23, inclusive, are coming in rapidly and already it is assured that the exhibit will far exceed that of the first automobile show, given here last year. It is feared that the National Theater may not be sufficiently large to accomodate all the cars and that additional room may have to be provided for the show. It is stated that up to March 18 space had been reserved for displaying 30 different makes of passenger cars. These are principally of American make, but there are three European manufacturers who have secured floor space through their local representatives. The European machines are the Fiat cars, Mercedes and Renault.

A department has been reserved for trucks and tractors, as was the case last year. These are all of American make. There will be exhibits of lubricants and all manner of automobile accessories, but no tires as was during the 1921 show.

ASKS FOR RECEIVER FOR NATIONAL

Indianapolis, March 28—Suit for appointment of a receiver for the National Motor Car & Vehicle Corp., of this city, makers of the "National," was brought here by the Columbia Axle Co., of Cleveland. The petition of the plaintiff alleged that the liabilities of the automobile company were in excess of $1,300,000 and that the company's business was suffering from a lack of working capital. The petitioners represent a claim of $13,305.

George M. Dixson, president of the National Motor Car & Vehicle Corp., and M. E. Elstun, secretary-treasurer, gave out the following statement: "The court action was brought through a misunderstanding and will be entirely eliminated by plans now completed and to be carried out fully at once. The financial affairs of the National Motor Car & Vehicle Corp., according to present agreement with all parties concerned, will be carried out as originally planned."

TO HOLD SHOW AT DAVENPORT, IA.

Davenport, Ia., March 25.—Launching of the Davenport automobile show in the Coliseum April 3-8 will probably mean the organization of a Davenport Automobile Dealers' association independent of the Tri-city Auto Trades association, the original club of dealers.

SERVICE ASSOCIATION ORGANIZED

Philadelphia, March 27—At the invitation of the Philadelphia Automobile Trade Assn., service manager of member companies met for the purpose of formally starting a service association. About 50 attended and were addressed by local dealers, H. R. Cobleigh of the N. A. C. C., Henry M. Holt, president of the Automotive Service Assn. of New York and J. Howard Pile, technical editor of Motor World and a director of the New York association. It was voted to follow the already accepted nomenclature and call the new organization the "Automotive Service Assn. of Philadelphia."

Tentative purposes and policies were decided on and a committee of seven appointed to draw up a constitution and by-laws to be presented at the next meeting to be held March 28. D. F. Hopkins, associate editor of the Automobile Trade Journal, was made temporary secretary and publicity director and the naming of other officials was left open. For the present the membership will be limited to service managers and assistant service managers of member companies of the Trade Assn. and other dealers with factory contracts.

MACK TRUCKS, INC., IS NEW NAME

New York, March 25—Stockholders of the International Motor Truck Co. at their annual meeting here this week decided to change the name of the company to Mack Trucks, Inc. All the directors of the company were re-elected. No other business was transacted.

TIRE SALES INCREASE

Akron, O., March 27—Announcement is made by the General Tire & Rubber Co. that its sales for the first quarter of the new fiscal year have been 65 per cent larger in dollars and cents than for the same period a year ago. In units the sales increase is 100 per cent.